Table II.D-2

Comparisons of Impacts for Alternatives A, B, C, D, and E, and the Preferred Alternative for the National Petroleum Reserve — Alaska Planning Area Integrated Activity Plan/ Environmental Impact Statement

Soils
Paleontological Resources
Water Resources
Water Quality
Air Quality
Vegetation
Fish Resources
Birds
Mammals — Terrestrial
Mammals — Marine
Endangered and Threatened Species
Economy
Cultural Resources
Subsistence-Harvest Patterns
Sociocultural Systems
Coastal Zone Management
Recreational and Visual Resources

The summaries presented in this table are based on the comprehensive analysis in Sections IV.B, C, D, E, F, and G, of an Integrated Activity Plan that includes potential oil and gas lease sales in the planning area; these summaries are based on the initial oil and gas lease sale which was the focus of the analysis.

TABLE II.D-2

SOILS		
Alternative A	**Alternative B**	**Alternative C**
First Sale: Soil stability depends closely on vegetative cover; where vegetation is disturbed, impacts on soils follow. Impacts to soils from management actions under Alternative A would involve either disturbance or destruction of relatively small areas. The duration of these impacts may be short term, ranging from several years if the vegetation is disturbed and up to many decades if the soils are destroyed. The overall impact to soils of the 4.6 million acre planning area would be minor (with seismic) to negligible (without seismic).	**First Sale:** Areas of impacts and losses of soils from all activities are similar to those areas discussed under Vegetation (Sec. IV.C.6). More site-specific conclusions will follow project design and detailed soil survey.	**First Sale:** Estimated areas of impacts and losses of soils from all activities are similar to those areas discussed under Vegetation.
	Multiple Sales: Areas of impacts and losses of soils from all activities in multiple sales are similar to those areas discussed under Vegetation (Sec. IV.C.6).	**Multiple Sales**: Areas of impacts and losses of soils from all activities in multiple sales would be similar to those areas discussed under Vegetation (Sec. IV.D.6).
PALEONTOLOGICAL RESOURCES		
Alternative A	**Alternative B**	**Alternative C**
First Sale: Under Alternative A, impacts to paleontological resources would result from management activities other than oil and gas exploration (except seismic activity) and development. Impacts would include displacement and/or destruction of resources and would be minimal whether or not seismic activity is allowed.	**First Sale:** Under Alternative B, impacts to paleontological resources from management activities other than oil and gas exploration and development would be similar in nature to Alternative A. Impacts would include displacement and/or destruction of resources and would be minimal whether or not seismic activity is allowed. Under Alternative B, the potential impacts to paleontological resources from oil and gas exploration and development may be the same as or only slightly increased from the impacts from activities other than oil and gas under Alternative A.	**First Sale:** Under Alternative C, the probability of impacts to paleontological resources from management activities other than oil and gas exploration and development would be similar in nature but may be somewhat increased in magnitude over Alternative B. Under Alternative C, most of the impacts to paleontological resources would result from oil and gas exploration and development. When compared with Alternative B, the potential for impacts to paleontological resources may range from similar under Alternative A to somewhat greater under Alternative C.
	Multiple Sales: Under Alternative B, potential impacts to paleontological resources from management activities other than oil and gas exploration and development would be similar in nature to Alternative A, but the probability of impacts occurring might increase. Under Alternative B, the potential impacts to paleontological resources from oil and gas exploration and development would increase dramatically compared to Alternative A, because only seismic activities would be permitted under Alternative A.	**Multiple Sales**: Under Alternative C, potential impacts to paleontological resources from management activities other than oil and gas exploration and development would be similar in nature to Alternative B, but the probability of impacts occurring would increase. Under Alternative C, the potential impacts to paleontological resources from oil and gas exploration and development would increase by roughly 20 percent compared to Alternative B.
WATER RESOURCES		
Alternative A	**Alternative B**	**Alternative C**

First Sale: Impacts to water resources under Alternative A would be minimal and of short duration, except for minor diversions of shallow water tracks and limited ponding in places where seismic track depression compresses the organic mat. While these depressions may persist for years after the conclusion of the activity, their effect over the whole planning area, as defined by events of such magnitude, extent, and duration to create the effects discussed in Sec. IV.C.3 is not significant. Without seismic activity impacts to water resources would be negligible	**First Sale:** The impacts of activities other than oil and gas exploration and development under Alternative B are expected to be similar to those under Alternative A. The potential long-term impacts of oil and gas development activities on the water resources in the planning area include disturbance of stream banks or shorelines and subsequent melting of permafrost (thermokarst) and blockages of natural channels and floodways that disrupt drainage patterns. The potential short-term impacts, primarily during construction, would increase erosion and sedimentation and water removal from riverine pools and lakes. While any surface-disturbing activity could affect water resources, the potential adverse effects of Alternative B, because it excludes the critical lake and river habitat from leasing, while significant, would be the least of all the leasing options.	**First Sale:** The impacts of activities other than oil and gas exploration and development under Alternative C are expected to be similar to those under Alternative A (and similar to those under Alternative B). The potential long-term impacts (melting of permafrost and disrupting drainage patters) and short-term impacts (increasing erosion and sedimentation and removing water from riverine pools and lakes) of oil and gas exploration and development on the water resources in the planning area is expected to be greater for Alternative C than for Alternative B.
	Multiple Sales: Adverse impacts from multiple lease sales may be up to several times greater than a single sale, while indirect impacts may take years to develop. Shared infrastructure could reduce the adverse effects to water resources of multiple lease sales, because combined facilities require less water for construction, maintenance, and camp use than separate, independent facilities.	**Multiple Sales**: Adverse impacts from multiple lease sales may be up to several times greater than a single sale, while indirect impacts may take years to develop. Shared infrastructure could reduce the adverse effects to water resources of multiple lease sales, because combined facilities require less water for construction, maintenance, and camp use than separate, independent facilities. Where infrastructure is not shared, both long and short-term impacts, and recovery times could increase.
WATER QUALITY		
Alternative A	**Alternative B**	**Alternative C**
First Sale: Long-term water quality over a total of less than a fraction of an acre would be affected by biannual 2-D seismic programs under Alternative A. Without seismic activity impacts to water quality would be negligible	**First Sale:** Longer-term (decade-or-more) effects of Alternative B would occur over a few hundred acres, versus a negligible amount for Alternative A because of the introduction of oil and gas activities construction or placement of ice roads. Oil spills could result in waters of about six ponds or small lakes remaining toxic to sensitive species for about 7 years. Water quality could be degraded over a few weeks along a short stretch of the Colville from a 325-bbl spill. The spreading of a similar-sized spill over about 60 acres of Teshekpuk Lake (0.03% of the lake surface) for a few weeks could be considered an effect on water quality.	**First Sale:** Effects under Alternative C are similar to those in Alternative B for oil and gas activities, and similar to those for Alternative A for activities other than oil and gas. Water quality over a few hundred acres could be affected by construction or placement of ice or gravel roads, and other structures. Oil spills could result in waters of up to seven ponds or small lakes remaining toxic to sensitive species for about 7 years. Water quality could be degraded over a few weeks along a short stretch of the Colville from a 325-bbl spill. The spreading of a similar-sized spill over about 60 acres of Teshekpuk Lake (0.03% of the lake surface) for a few weeks could be considered an effect on water quality.
	Multiple Sales: Longer-term (decade-or-more) effects of multiple sales would be similar to those for a single sale. Oil spills could result in waters of about eight ponds or small lakes remaining toxic to sensitive species for about 7 years.	**Multiple Sales**: Longer-term (decade-or-more) effects of multiple sales would be slightly greater than for a single sale. Oil spills could result in waters of up to nine ponds or small lakes remaining toxic to sensitive species for about 7 years. Water quality could be degraded over a few weeks along a short stretch of the Colville from a 325-bbl spill. The spreading of a similar-sized spill over about 60 acres of Teshekpuk Lake (0.03% of the lake surface) for a few weeks could be considered an effect on water quality
AIR QUALITY		

TABLE II.D-2

Alternative A	Alternative B	Alternative C
First Sale: Air quality would not be affected by air-impacting actions within the planning area under Alternative A whether or not seismic activity is allowed.	**First Sale:** Activity associated with Alternative B would result in a small, localized increase in the concentrations of criteria pollutants. Concentrations would be within the PSD Class II limits and National Air Quality Standards. Therefore, effects from Alternative B would be low. Effects of activities other than oil and gas are negligible, as in Alternative A.	**First Sale:** The impacts of oil and gas activities under Alternate C would be similar to those under Alternative B. Annually, air quality would be affected by drilling and construction activities at levels less than the PSD criteria. Effects of activities other than oil and gas are negligible, as in Alternative A.
	Multiple Sales: Activities associated with multiple sales would result in sequential effects which would remain small and localized. Concentrations would remain within the PSD Class II limits and effects would remain low.	**Multiple Sales**: Activities associated with multiple sales would result in sequential effects which would remain small and localized. Concentrations would remain within the PSD Class II limits and effects would remain low.
VEGETATION		
Alternative A	**Alternative B**	**Alternative C**
First Sale: Impacts to vegetation from management actions under Alternative A would involve either disturbance or destruction. If the option allowing seismic exploration is implemented, seismic work would account for most (>95%) of those impacts. The duration of all impacts would be short term, ranging up to 5 months, and complete recovery could vary from 1 year to decades. The overall impact to the vegetation communities of the 4.6-million-acre planning area would be minor (with seismic) to negligible (without seismic).	**First Sale:** Impacts to vegetation from activities other than oil exploration and development under Alternative B would be the same as those under Alternative A, except that the effects of archaeological excavation might increase from 1 to 2 acres. The impacts of oil exploration would include vegetation disturbance on about 7,350 acres per year from 2-D seismic work and 0 to 92,120 acres from 3-D surveys. About 17 percent of the disturbance from 2-D would be medium to high, with perhaps 20 percent at that level for 3-D. After 9 years, recovery would be about 90 percent for 2-D seismic work and probably somewhat less for 3-D. Exploration activities also would result in minor vegetation destruction and alteration from the construction of exploration well collars that would be permanent. The activities of oil field development that would impact vegetation include construction of gravel pads, roads, and airstrips for each oil field; potential construction of one pump station within the planning area; excavation of material sites; and construction of pipelines. The combined effect of these activities would cause the destruction of vegetation on 0 to 180 acres and the alteration in plant species composition of another 0 to 280 acres, for a total of effects over 0 to 460 acres. The duration of these impacts would be permanent, assuming that the gravel pads would remain after oil production ends, and recovery would be moot. Oil spills are inevitable during exploration and development and would affect 0.0 to 2.6 acres of vegetation within the planning area. Spills would be cleaned up immediately, would cause minor ecological damage, and ecosystems would be likely to recover in a few years to 2 decades.	**First Sale:** Impacts to vegetation from activities other than oil exploration and development under Alternative C would be the same as those under Alternative A, except that the effects of archaeological excavation might increase from 1 to 4 acres. The impacts of oil exploration and development would be of the same types as for Alternative B but greater in areal extent. The maximum acreage affected by 3-D seismic surveys would increase from 0 to 92,000 acres to 46,000 to 138,000 acres. The combined effect of development activities would cause the destruction of vegetation on 140 to 320 acres rather than 0 to 180 acres and the alteration in plant species composition of another 220 to 500 acres instead of 0 to 280 acres, for a total of effects over 360 to 820 acres rather than 0 to 460 acres. Finally, the occurrence of oil spills would increase, affecting 0.5 to 3.0 acres instead of 0.5 to 2.6 acres, but the probability of a blowout would remain low.

	Multiple Sales: The impacts of oil exploration would include more vegetation disturbance from seismic work than under a single-sale scenario, but the extended period of time over which it would occur, coupled with the recovery time for disturbed areas, would result in only a small increase in the amount of disturbance that would be evident at any one time. Exploration activities also would result in 0.02 to 0.2 acres of permanent vegetation destruction around well collars and alteration of 0.1 to 0.7 acres around ice pads. The activities of oil field development that would impact vegetation include construction of gravel pads, roads, and airstrips for each oil field; potential construction of one pump station within the planning area; excavation of material sites; and construction of pipelines. The combined effect of these activities would cause the destruction of vegetation on 0 to 320 acres and the alteration in plant species composition of another 0 to 500 acres, for a total of effects over 0 to 820 acres. The duration of these impacts would be permanent, assuming that the gravel pads would remain after oil production ends, and recovery would be moot. Oil spills would affect 0.0 to 3.7 acres of vegetation within the planning area. Recovery from spills would take a few years to two decades.	**Multiple Sales**: The impacts of oil exploration would include more vegetation disturbance from seismic work than under a single-sale scenario, but the extended period of time over which it would occur, coupled with the recovery time for disturbed areas, would result in a small increase in the amount of disturbance that would be evident at any one time. Exploration activities also would result in 0.05 to 0.2 acres of permanent vegetation destruction around well collars and alteration of 0.2 to 0.8 acres around ice pads. The activities of oil field development that would impact vegetation include construction of gravel pads, roads, and airstrips for each oil field; potential construction of one pump station within the planning area; excavation of material sites; and construction of pipelines. The combined effect of these activities would cause the destruction of vegetation on 140 to 460 acres and the alteration in plant species composition of another 220 to 720 acres, for a total of effects over 360 to 1,180 acres. The duration of these impacts would be permanent, assuming that the gravel pads would remain after oil production ends, and recovery would be moot. Oil spills would affect 0.8 to 4.2 acres of vegetation within the planning area. Recovery from spills would take a few years to two decades. The probability of a blowout would remain low.
FISH RESOURCES		
Alternative A	**Alternative B**	**Alternative C**
First Sale: Seismic surveys, if allowed, and fuel spills are not expected to have a measurable effect on arctic fish populations in the planning area over the life of the IAP.	**First Sale:** Based on the discussion in the text, fuel spills associated with Alternative B are expected to have a similar effect on arctic fish populations as discussed for Alternative A. Seismic surveys, construction related activities (drill pads, roads, airstrips, pipelines, and gravel extraction); and fuel, oil, and seawater spills associated with Alternative B are not expected to have a measurable effect on arctic fish populations in the planning area over the production life of the field.	**First Sale:** The effect of fuel spills on arctic fish populations in Alternative C are expected to be similar to Alternative A. The individual effects of seismic surveys, construction related activities, and oil and seawater spills are expected to be similar to that of Alternative B. However, the likelihood of their occurrence is estimated to be roughly two to three times higher for Alternative C than for Alternative B. Depending on the actual level and location of implementation, this could result in a corresponding increase in the overall effect of these activities on arctic fish populations in Alternative C over that of Alternative B.
	Multiple Sales: Seismic surveys and pipelines associated with multiple sales are expected to have the same overall effect on arctic fish populations as the first sale. Gravel pads are expected to have about twice the effect as the first sale. Fuel and oil spills are likely to have a greater effect on arctic fish populations than the first sale. Insufficient recovery time between sales and/or greater levels of activity would be likely to result in greater effects than estimated herein for multiple sales.	**Multiple Sales**: Seismic surveys and pipelines associated with multiple sales are expected to have the same overall effect on arctic fish as the first sale. Gravel pads are expected to have about twice the effect as the first sale. Fuel and oil spills are likely to have a greater effect on arctic fish populations than the first sale. Insufficient recovery time between sales and/or greater levels of activity would be likely to result in greater effects than estimated herein for multiple sales.
BIRDS		
Alternative A	**Alternative B**	**Alternative C**

First Sale: Under Alternative A, most disturbance effects associated with ground transport and seismic surveys in winter, moderate flight frequency supporting large and small camps and aerial surveys, moderate increases of boat traffic on the Colville River, air transport of recreational parties, and spill-cleanup activities in summer, are expected to be localized, to within 700 ft to 0.6 mi of the disturbing activity, and temporary, ranging from brief (<1 day) in the case of response to a few aircraft flights or presence of ground or boat activity to several months for extended ground-transport operations. Elimination of seismic activity would result in a minor decrease of disturbance effects on 3 winter-resident species. More intense activity, such as routine overflights of goose-molting lakes, the combination of large camp activity and associated aircraft operations, substantially increased river-boat traffic, or fuel spills entering lakes with large molting goose populations, is expected to result in more substantial losses, but recovery of lost productivity and recruitment may not be detectable above the natural fluctuations of the population and survey methods/data available. If seismic surveys are not allowed there should be a small decrease in impacts to birds which winter in the area including ptarmigan, gyrfalcons and snowy owls.	**First Sale:** Under Alternative B, most disturbance effects not associated with oil and gas activities are expected to be similar to those discussed for Alternative A, although lost productivity of nesting species and decreased survivorship of molting birds may not be detectable above the natural fluctuations of the population. Most raptors exposed to such activities at distances < 1 mi exhibit minor behavioral changes and > 1 mi experience no apparent effect or reduced productivity. Overall effect of aircraft operations supporting oil and gas activities, and most other activities causing disturbance, on productivity or recruitment of bird populations in the vicinity of drill sites is expected to be localized and minor, but likewise may not be detectable above the natural fluctuations of the population. Losses attributed to predators attracted to sites may be substantial but is difficult to quantify. Displacement of nesting birds from gravel structures and pits is expected to have primarily minor local effects on productivity because displaced individuals are likely to use adjacent undisturbed habitats. As a result of their small average size, onshore oil spills reaching aquatic habitats are expected to cause losses of tens of individuals, but the effect of such losses may not be detectable above the natural fluctuations of the population. An oil spill at a well within 2 miles of the coast is expected to have similar effects as other onshore spills; it is unlikely to enter the marine environment. Because overall effects of management actions on birds in the Northeast NPR-A area are expected to be minor, effects on stakeholder groups also are expected to be minor.	**First Sale:** Effects of actions other than oil and gas activity under Alternative C are expected to be essentially the same as for Alternative B, except in the Colville River corridor, where increased activity would result in greater effects. Effects of oil and gas activity are not expected to be significantly different than discussed for Alternative B. As a result of their small average size, onshore oil spills reaching aquatic habitats are expected to cause losses of tens of individuals, but the effect of such losses may not be detectable above the natural fluctuations of the population. A crude-oil spill from an offshore site in the marine environment during August or September could contact loons and flocks of Brant, Oldsquaw, and/or eiders staging in protected coastal habitats or waters farther offshore. Some broodrearing, molting, or staging Brant, Canada Geese, Snow Geese, Oldsquaw, King Eiders, and Common Eiders could be contacted in coastal habitats. Mortality of molting Oldsquaw could be substantial, but the effect would be difficult to determine due to an uncertain population status. Because of an apparently declining population, substantial King Eider mortality could be significant. Also, several thousand shorebirds could encounter oil in shoreline habitats. A spill that enters open water off river deltas in spring, or nearshore areas in fall, could contact migrant loons and eiders.
BIRDS		
Alternative A	**Alternative B**	**Alternative C**

	Multiple Sales: Displacement of birds from disturbance and habitat alteration is expected to double in the southern half of the planning area under Alternative B with multiple sales, but still not significantly affect coastal plain populations. Increases in oil and refined oil spills are expected to result in the loss of small numbers of birds but the loss is not likely to be detectable above the natural fluctuations of the population and survey methods/data available. Overall effect is expected to increase somewhat from that discussed for the first sale.	**Multiple Sales**: Displacement of birds from disturbance and habitat alteration is expected to increase over the southern three-quarters of the planning area under Alternative C with multiple sales, but not significantly affect planning area populations. Increases in oil and refined oil spills are expected to result in the loss of small numbers of birds but the loss is not likely to be detectable above the natural fluctuations of the population and survey methods/data available. Overall effect is expected to increase somewhat from that discussed for the first sale.
TERRESTRIAL MAMMALS		
Alternative A	**Alternative B**	**Alternative C**
First Sale: The effects of Alternative A, other than seismic operations, on terrestrial mammals are expected to be local, within about 1 to 2 km of activities, and short term, with no significant adverse effects on mammal populations (except the arctic fox, which may increase in abundance near permanent camp facilities). Seismic operations also would have short-term and local effects on terrestrial mammals but would not affect populations or overall distribution.	**First Sale:** For activities other than oil and gas, air traffic, humans on foot, and the presence of resource-inventory-survey camps are expected to increase under Alternative B as compared to Alternative A, but these activities are not expected to affect terrestrial mammal populations. For oil and gas activities, the level of effects from noise, disturbance, and habitat alteration is expected to increase in the southern half of the planning area. Increased habitat alteration would include the development of one oil field and a pipeline to the TAPS. Caribou of the CAH and TLH are expected to be disturbed and their movements delayed along the pipeline during periods of aircraft overflights (e.g., to inspect the pipeline), but these disturbances are not expected to affect migrations and overall distribution. Near oil field facilities, surface, air, and foot traffic is expected increase under Alternative B and to displace some caribou, moose, muskoxen, grizzly bears, wolves, and wolverines but not significantly affect Arctic Slope populations. The number of small, chronic crude-oil and fuel spills and a potential spill contacting Teshekpuk Lake or reaching the Colville River are expected to result in the loss of small numbers of terrestrial mammals, with recovery expected within about 1 year. Trenching and burial of pipelines at river crossings would have very local effects on tundra and riparian vegetation and would not significantly affect terrestrial mammal habitats.	**First Sale:** For activities other than oil and gas, the effects of Alternative C are expected to be similar to those of Alternative A. For oil and gas activities, effects of Alternative C are expected to be somewhat greater than those of Alternative B. Increased habitat alteration would include the development of one or two oil fields and a pipeline to the TAPS. Some CAH and TLH caribou are expected to be disturbed and their movements delayed along the pipeline during periods of air traffic, but these disturbances are not expected to affect caribou migrations and overall distribution. Near the oil fields, surface, air, and foot traffic is expected to increase and to displace some terrestrial mammals but not significantly affect Arctic Slope populations. The number of small, chronic crude-oil and fuel spills, including a potential oil spill contacting Teshekpuk Lake or the Colville River, are expected to result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year. Trenching for and burial of pipelines at river crossings would have very local effects on tundra and riparian vegetation and would not significantly affect terrestrial mammal habitats. Under Alternative C, some terrestrial mammals could be affected by possible oil exploration offshore from an ice island and subsequent oil development on the coast of the NPR-A in Harrison Bay in a small area south of Atigaru Point (Figure II.C.1-3). Effects of these activities would be local and are not likely to affect terrestrial mammal populations.

	Multiple Sales: The level of effects due to noise, disturbance, and habitat alteration is expected to increase in the southern half of the planning area under Alternative B with multiple sales. Near oil field facilities, surface, air, and foot traffic are expected increase and to displace some caribou, moose, muskoxen, grizzly bears, wolves, and wolverines, but not significantly affect Arctic Slope populations. The number of small, chronic crude-oil and fuel spills is expected to increase and result in the loss of small numbers of terrestrial mammals, with recovery expected within about 1 year.	**Multiple Sales**: Effects of oil and gas activities under multiple sales are expected to be somewhat greater than those of Alternative C under the first sale. Surface, air, and foot traffic near the oil fields is expected to increase and to displace some terrestrial mammals but not significantly affect Arctic Slope populations. The number of small, chronic crude-oil and fuel spills is expected to increase somewhat and result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year.
MARINE MAMMALS		
Alternative A	**Alternative B**	**Alternative C**
First Sale: The effects of Alternative A, other than seismic operations, on marine mammals, particularly polar bears and seals, along the coast of the planning area are expected to be local and to occur within about 1 mi of resource-inventory-survey activities, survey and recreational camps, and overland moves. These effects are expected to be short term, with no significant adverse effects on the populations as a whole. Seismic operations occurring near the coast could disturb a few polar bear dens, displacing the bears, and may adversely affect the survival of cubs; however, this level of effect is not likely to be significant to the population.	**First Sale:** For marine mammals, the effects of activities other than oil and gas under Alternative B are expected to be similar to those under Alternative A—local and short term, with no significant adverse effects to the populations as a whole. The effects of oil and gas activities for Alternative B are expected to increase somewhat over those of Alternative A. However, most oil and gas activities under Alternative B are expected to occur inshore and far to the south of the coast. Only a small increase in potential noise and disturbance effects is expected along the coast, primarily in the Colville River Delta-inner Harrison Bay area, and these effects are expected to be local and short term (generally <1 year). A small number of seals and no more than a few polar bears might be adversely affected or killed by a 325-bbl crude-oil spill contacting the Colville River and some of the oil reaching marine waters, but these losses wouldn't be significant to marine mammal populations.	**First Sale:** For marine mammals under Alternative C, the effects of activities other than oil and gas are expected to be similar to those for Alternative A; the effects of oil and gas activities are expected to increase slightly over the effects for Alternative B.
	Multiple Sales: Multiple sales under Alternative B are expected to have similar effects to those under Alternative B with one sale, i.e., local and short term, with no significant adverse effects to marine mammal populations as a whole.	**Multiple Sales**: The effect of oil and gas activities under Alternative C with multiple sales is expected to increase slightly over those effects for Alternative B with multiple sales.
ENDANGERED AND THREATENED SPECIES		
Potential effect common to all Alternatives: Disturbance, depending on the nature and duration of the disturbance, could be considered a "take" under the ESA.		
Alternative A	**Alternative B**	**Alternative C**

First Sale: Bowhead whales are not likely to be affected by activities associated with the management plan. Overall, the effects on spectacled and Steller's eiders exposed to noise-producing activities are expected to be minimal. Eiders breeding, nesting, or rearing young in coastal habitats or other areas within the planning area may be overflown by support aircraft and may experience temporary, nonlethal effects, probably lasting less than an hour. Eiders affected by activities associated with hazardous- and solid-material removal and remediation may be affected for as long as 4 weeks. Because of the relatively low density of eiders in the planning area, substantial disturbance is not expected to occur and is likely to be limited to within a few kilometers of the activities. Such short-term and localized disturbances are not expected to cause significant population effects. However, disturbance of some individuals over the life of the project is expected to be unavoidable. Seismic activities are unlikely to have an impact on the threatened and endangered species.	**First Sale:** Overall, bowhead whales exposed to noise-producing activities such as marine vessel traffic and possibly aircraft overflights most likely would experience temporary, nonlethal effects. Bowheads may exhibit temporary avoidance behavior in response to vessel and aircraft activities. In general, bowheads do not appear to travel more than a few kilometers in response to a single disturbance incident. Behavioral changes as a result of exposure to vessel or aircraft traffic likely will last only a few minutes after the disturbance has left the area or the whales have passed. Overall, spectacled and Steller's eiders are not expected to be exposed to most noise-producing activities from oil and gas operations. Any effects from exposure likely would be minimal. Spectacled and Steller's eiders breeding, nesting, or rearing young in coastal habitats may be overflown by support aircraft and may experience temporary, nonlethal effects, probably lasting less than an hour. In the central portion of the planning area, Steller's eiders occasionally may be overflown by support aircraft, disturbed by noise from drilling or vehicular traffic during development/production activities in the summer, or affected by oil-spill-cleanup activities and may experience temporary, nonlethal effects lasting probably less than an hour but possibly continuing all summer in the case of summer drilling operations. It is unlikely that the primary Alaskan nesting area, located south and southeast of Barrow, would be affected much by these activities; so significant disturbance of nesting or broodrearing eiders is not expected to occur. Improper containment or disposal of refuse at support camps could attract potential bird predators. It is possible that an increase in predators could result in the loss of eggs, chicks, or even adult eiders. Some eiders may be affected by activities associated with the management plan other than oil and gas activities, such as hazardous- and solid-material removal and remediation and summer aircraft flights over sensitive areas. Nesting females and their broods may experience temporary, nonlethal effects as a result of these activities. Such short-term and localized disturbances are not expected to cause significant population effects. However, disturbance of some individuals over the life of the project is expected to be unavoidable.	**First Sale:** The potential effects on bowhead whales from discharges, noise and disturbance, and oil spills are expected to be essentially the same under this alternative as under Alternative B. The potential effects on spectacled and Steller's eiders from discharges, noise and disturbance, seawater spills, and oil spills associated with oil and gas activities are expected to be essentially the same under this alternative as under Alternative B. However, there may be an increase in potential effects on eiders from activities other than oil and gas activities associated with the management plan due to an increase in summertime aircraft flights over sensitive areas that may affect nesting females and their broods. Under this alternative, there would be an increase in the number of aircraft flights for aerial wildlife surveys and other aerial surveys. Aerial wildlife surveys in late June and early July increase from 14 days to 21 days. Spectacled and Steller's eiders breeding, nesting, or rearing young in the coastal areas may be overflown by support aircraft and may experience temporary, nonlethal effects lasting probably less than an hour. In the central portion of the planning area, Steller's eiders occasionally may be overflown by support aircraft and may experience temporary, nonlethal effects lasting probably less than an hour. It is unlikely that the primary Alaskan nesting area, located south and southeast of Barrow, would be affected much by these activities; so significant disturbance of nesting or broodrearing eiders is not expected to occur. Such short-term and localized disturbances are not expected to cause significant population effects. However, disturbance of some individuals over the life of the project is expected to be unavoidable.
ENDANGERED AND THREATENED SPECIES		
Alternative A	**Alternative B**	**Alternative C**

TABLE II.D-2

	Multiple Sales: Effects of multiple sales are expected to be essentially as described above for the first sale. Bowhead whales exposed to noise-producing activities such as marine-vessel traffic and possibly aircraft overflights most likely would experience temporary, nonlethal effects. Spectacled and Steller's eiders are not expected to be exposed to most noise-producing activities from oil and gas operations, and any effects from exposure likely would be minimal. The assumptions that oil spills would be relatively small in size, that the majority of the spills would occur on pads, and that small areas would be affected where spills occur off the pads would remain the same as for the first sale. Therefore, the effects of multiple sales and increased potential for noise-producing activities and oil spills on endangered and threatened species at the resource ranges and activity levels described are expected to be essentially the same as described for the single sale.	**Multiple Sales**: The effects of multiple sales and increased potential for noise-producing activities and oil spills on endangered and threatened species at the resource ranges and activity levels described are expected to be essentially the same as described above for the first sale.
ECONOMY		
Alternative A	**Alternative B**	**Alternative C**
First Sale: For activities other than oil and gas exploration and development for Alternative A, generating approximately 50 jobs for 4_ months associated with seismic surveys and recreation-field employment, which is equal to one person working 4 months per year. For oil and gas exploration and development activities for Alternative A, there would be no economic effects.	**First Sale:** For activities other than oil and gas exploration and development, Alternative B would generate approximately 50 jobs for 4_ months associated with seismic surveys and recreation employment, equivalent to one person working 8 months per year. For oil and gas exploration and development activities, production under Alternative B is projected to generate increases above the levels of Alternative A as follows: NSB property taxes, 0 to 2 percent ($0-$3 million); direct oil-industry employment, 0 to 700 (5 times this in additional jobs) residing in Southcentral Alaska; NSB resident employment, 0 to 2 percent; annual revenues of $0 to $0.75 million property tax to the State; $4 to $37 million royalty to the Federal Government; $4 to $37 million royalty to the State and the NSB; and $6 to 62 million severance tax to the	**First Sale:** For activity other than oil and gas, Alternative C would generate approximately 50 jobs for 4_ months associated with seismic surveys and recreation-field employment, which is equal to one person working 8 months per year. Activities other than oil and gas would have no effect; production in Alternative C is projected to generate increases above the levels of Alternative B as follows: NSB property taxes, 1 percent ($1-$2 million); direct oil-industry employment, 200 to 500 during production (5x this in additional jobs) residing in Southcentral Alaska; NSB resident employment, 1 percent; and annual revenues of $0.25 to $0.5 million property tax to the State, $0 to $6 million royalty to the Federal Government, $0 to $6 million royalty to the State and NSB, and $1 to $11 million severance tax to the State.
	Multiple Sales: The effect of multiple sales for Alternative B is projected to be approximately two times that of Alternative B.	**Multiple Sales**: The effect of multiple sale for Alternative C is project to be approximately two times that of the first sale for Alternative C.
CULTURAL RESOURCES		
Alternative A	**Alternative B**	**Alternative C**
First Sale: Under Alternative A, impacts to cultural resources would result from management activities other than oil and gas exploration (except seismic activity) and development. Impacts would include displacement and or destruction of resources and would be minimal. Adopting the no seismic option would reduce these impacts slightly because above-ground structures would be at reduced risk.	**First Sale:** Under Alternative B, impacts to cultural resources from management activities other than oil and gas exploration and development would be similar in nature to but of an increased magnitude from those of Alternative A. Impacts would include displacement and or destruction of resources and would be minimal. Adopting the no seismic option would reduce there impacts slightly because above ground structures would be at reduced risk. Under Alternative B, most of the potential impacts to cultural resources would result from oil and gas exploration and development.	**First Sale:** Under Alternative C, impacts to cultural resources from management activities other than oil and gas exploration and development would be similar in nature but may be somewhat increased in magnitude over Alternative A. Under Alternative C, most of the impacts to cultural resources would result from oil and gas exploration and development, although there is a possibility that no such activities would impact cultural resources sites. When compared with Alternative B, the potential for impact to cultural resources is somewhat greater under Alternative C.

	Multiple Sales: Under Alternative B, potential impacts to cultural resources from management activities other than oil and gas exploration and development would be similar in nature to Alternative A, but the probability of impacts occurring might increase. Under Alternative B, the potential impacts to cultural resources from oil and gas exploration and development would increase dramatically compared to Alternative A, because only seismic activities are permitted under Alternative A.	**Multiple Sales**: Under Alternative C, potential impacts to cultural resources from management activities other than oil and gas exploration and development would be similar in nature to Alternative B, but the probability of impacts occurring would increase. Under alternative C, the potential impacts to cultural resources form oil and gas exploration and development would increase by roughly 20 percent compared to Alternative B.
SUBSISTENCE		
Alternative A	**Alternative B**	**Alternative C**
First Sale: Impacts, other than seismic activity, under Alternative A on subsistence resources range from negligible effects on fish and bowhead whales to short term and local effects on caribou and other terrestrial mammals, birds, and marine mammals. Impacts with seismic activity could displace a few polar bears in dens and affect cub survival but not have a significant effect on the bear population. Short-term and local effects would be expected on caribou and other terrestrial mammals and birds; negligible effects would be expected on arctic fish populations and bowhead whales. Subsistence resources of the communities of Barrow, Atqasuk, and Nuiqsut could be affected periodically from ground-disturbance activities (other than seismic activities) and oil spills, but there would be no apparent effects on subsistence activities.	**First Sale:** Overall effects associated with Alternative B subsistence-harvest patterns in the communities of Barrow, Atqasuk, and Nuiqsut, and other nearby communities from oil and gas activities in the planning area as a result of impacts from disturbance and oil spills are expected to periodically impact subsistence resources, but no resource would become unavailable, undesirable for use, or experience overall population reductions.	**First Sale:** Overall effects associated with Alternative C subsistence-harvest patterns in the communities of Barrow, Atqasuk, and Nuiqsut, and other nearby communities from oil and gas activities in the planning area as a result of impacts from disturbance and oil spills are expected to increase somewhat over Alternative B. Periodic impacts to subsistence resources are expected but no resource would become unavailable, undesirable for use, or experience overall population reductions, essentially the same level of effect as Alternative B.
SUBSISTENCE		
Alternative A	**Alternative B**	**Alternative C**

	Multiple Sales: Effects from multiple sales to terrestrial mammals are expected to increase, but no significant impacts to populations are anticipated. Disturbance from air, surface, and foot traffic could displace some caribou and other terrestrial mammals. Small numbers of terrestrial mammals would be lost due to the increase of small, chronic crude-oil and fuel spills, but populations are expected to recover within 1 year. Arctic fish populations would experience effects similar to the first sale as high-density fish areas are deferred, but increases are expected if sale intervals are not spaced sufficiently to provide population recovery. Increased disturbance and displacement effects and increased oil-spills risks are expected for birds, but timing of the sales again is critical to recovery. With extended intervals between sales, impacted bird populations are expected to recover from noise and disturbance effects in 1 year. Bowhead whales are expected to experience short-term, nonlethal effects. Effects to marine mammals would be short term and local with no adverse effects to populations. Given that resource estimates and development scenarios project an increase in resources and increases in the number of drill pads and pipeline miles, logic would assume increased effects to potentially affected resources, except for the fact that these effects would be spread over 2 decades. The biological analyses expect slight increases in effects with little overall effects to resource populations. Effects associated with multiple sales on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and (especially) Nuiqsut as a result of impacts from disturbance and oil spills are expected to make no subsistence resource unavailable, undesirable for use, or experience overall population reductions.	**Multiple Sales**: Effects from multiple sales to terrestrial mammals are expected to increase but no significant impacts to populations are anticipated. Small numbers of terrestrial mammals would be lost due to the increase of small chronic crude oil and fuel spills, but populations are expected to recover within 1 year. Arctic fish populations would experience effects similar to Alternative B as high-density fish areas are unavailable to leasing, but increases are expected if sale intervals are not spaced sufficiently to provide population recovery. Increased disturbance and displacement effects and increased oil-spill risks are expected for birds, but timing of the sales again is critical to recovery. With extended intervals between sales, impacted bird populations are expected to recover from noise and disturbance effects in 1 year. Bowhead whales, as in Alternative B, are expected to experience short-term, nonlethal effects. Effects to marine mammals would be short term and local with no adverse effects to populations. Given that resource estimates and development scenarios project an increase in resources and increases in the number of drill pads and pipeline miles, logic would assume increased effects to potentially affected resources, except for the fact that these effects would be spread over 2 decades. The biological analyses expect slight increases in effects with little overall effect to resource populations. Effects associated with multiple sales on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and (especially) Nuiqsut as a result of impacts from disturbance and oil spills are expected to make no subsistence resource unavailable, undesirable for use, or experience overall population reductions.
SOCIOCULTURAL SYSTEMS		
Alternative A	**Alternative B**	**Alternative C**

First Sale: Due to no increase in effects to the sociocultural systems of Barrow, Atqasuk, and Nuiqsut from this no-action alternative, impacts are expected to be negligible.	**First Sale:** Effects from management actions and oil and gas activities in the planning area under Alternative B are unlikely to disrupt sociocultural systems. Periodic, short-term disturbance effects would be expected on the sociocultural systems of Barrow, Atqasuk, and Nuiqsut but these disturbances are not expected to disrupt or displace institutions and sociocultural systems; community activities; and traditional practices for harvesting, sharing, and processing subsistence resources.	**First Sale:** Effects from management actions and oil and gas activities in the planning area under Alternative C are unlikely to disrupt sociocultural systems. Periodic, short-term disturbance effects would be expected on the sociocultural systems of Barrow, Atqasuk, and Nuiqsut but these disturbances are not expected to disrupt or displace institutions and sociocultural systems; community activities; and traditional practices for harvesting, sharing, and processing subsistence resources.
	Multiple Sales: Effects from management actions and oil and gas activities in the planning area for multiple sales under Alternative B could disrupt sociocultural systems for periods up to 1 year, but impacts would not be expected to displace institutions and sociocultural systems, community activities, or traditional practices for harvesting, sharing, and processing subsistence resources.	**Multiple Sales**: Effects from management actions and oil and gas activities in the planning area for multiple sales under Alternative C could disrupt sociocultural systems for periods up to 1 year, but impacts would not be expected to displace institutions and sociocultural systems, community activities, or traditional practices for harvesting, sharing, and processing subsistence resources, the same level of effect anticipated for multiple sales under Alternative B.
COASTAL ZONE MANAGEMENT		
Alternative A	**Alternative B**	**Alternative C**
First Sale: There are no ground-impacting-management actions within the planning area that require coastal consistency reviews by the State if seismic activity is allowed.	**First Sale:** For Alternative B, conflicts could occur with specific Statewide standards and NSB CMP policies related to potential user conflicts between development activities and access to subsistence resources. Conflicts are possible with the NSB CMP policy related to adverse effects on subsistence resources resulting from periodic disturbance and oil spills, but no resource would become unavailable, undesirable for use, or experience overall population reductions. These effects would occur in the unlikely event of spilled oil contacting subsistence resources and habitats and the activities associated with oil-spill cleanup. No conflicts are anticipated during exploration, since no oil spills are assumed to occur during exploration.	**First Sale:** For Alternative C, the effects of potential conflicts with the State's and Borough's coastal management programs are expected to be about the same as for Alternative B, because no leasing in important caribou and waterfowl areas would occur under Alterative C. Problems could occur with specific Statewide standards and NSB CMP policies related to user conflicts between development activities and access to subsistence resources. Conflicts are possible with the NSB CMP policy related to adverse effects on subsistence resources. These effects could occur as a result of spilled oil contacting subsistence resources and habitats and as a result of the activities associated with oil-spill cleanup. No conflicts are anticipated during exploration.
COASTAL ZONE MANAGEMENT		
Alternative A	**Alternative B**	**Alternative C**

	Multiple Sales: Displacement of birds from disturbance and habitat alternation is expected with multiple sales, but should not significantly affect coastal plain bird populations. Effects from multiple sales to terrestrial mammals are expected to increase, but no significant impacts to populations are anticipated. Small numbers of terrestrial mammals would be lost due to the increase of small, chronic crude-oil and fuel spills, but populations are expected to recover within 1 year (Sec. IV.C.9). Arctic fish populations would experience effects from seismic surveys and pipelines similar to those discussed for the first sale (i.e., no measurable effect on arctic fish populations). However, fuel and oil spills are likely to have a greater effect on fish populations than the first sale. Insufficient recovery time between sales and/or greater levels of activity would be likely to result in greater effects than estimated for multiple sale. Increased disturbance and displacement effects and increased oil-spills risks are expected to increase for birds in the southern half of the planning area under Alternative B with multiple sales, but not significantly affect coastal plain populations. Bowhead whales exposed to noise-producing activities such as marine-vessel traffic and possibly aircraft overflights most likely would experience temporary, nonlethal effects. Effects of multiple sales and increased potential for noise-producing activities and oil spills to marine mammals would be short term and local with no adverse effects to populations. Multiple sales may cause potential conflicts with the subsistence, habitat, air- and water-quality, and transportation standards of the ACMP; however, each oil and gas lease operating plan would be reviewed for consistency on a case-by-case basis.	**Multiple Sales**: Displacement of birds from disturbance and habitat alternation is expected with multiple sales, but should not significantly affect coastal plain bird populations. Effects from multiple sales to terrestrial mammals are expected to increase, but no significant impacts to populations are anticipated. Small numbers of terrestrial mammals would be lost due to the increase of small, chronic crude-oil and fuel spills, but populations are expected to recover within 1 year (Sec. IV.C.9). Arctic fish populations would experience effects from seismic surveys and pipelines similar to those discussed for the first sale (i.e., no measurable effect on arctic fish populations). However, fuel and oil spills are likely to have a greater effect on fish populations than the first sale. Insufficient recovery time between sales and/or greater levels of activity would be likely to result in greater effects than estimated for multiple sale. Increased disturbance and displacement effects and increased oil-spills risks are expected to increase for birds in the southern half of the planning area under Alternative B with multiple sales, but not significantly affect coastal plain populations. Bowhead whales exposed to noise-producing activities such as marine-vessel traffic and possibly aircraft overflights most likely would experience temporary, nonlethal effects. Effects of multiple sales and increased potential for noise-producing activities and oil spills to marine mammals would be short term and local with no adverse effects to populations. Multiple sales may cause potential conflicts with the subsistence, habitat, air- and water-quality, and transportation standards of the ACMP; however, each oil and gas lease operating plan would be reviewed for consistency on a case-by-case basis.
RECREATION AND VISUAL RESOURCES		
Alternative A	**Alternative B**	**Alternative C**

TABLE II.D-2

First Sale: Impacts to recreation and visual resources from activities other than oil and gas would be minimal and short term, affecting about 1,500 acres. Impacts from ongoing oil and gas activities (seismic surveys) also would be short term, affecting about 500 acres. Several hundred miles of green trails from overland moves and seismic surveys also would be visible during summer months.	**First Sale:** As compared to Alternative A, there would be an increase of approximately 500 acres to 2,000 acres in adverse, short-term impacts to recreation values from activities other than oil and gas exploration and development. Short-term impacts from ongoing oil and gas exploration activities would impact approximately 9,000 acres. The greening of vegetation resulting from ice pads, roads, airstrips, and compacted snow would impact about 500 acres. Seismic operations would result in several hundred miles of green trails, possibly double those of Alternative A. Oil and gas development would result in the long-term loss of scenic quality, solitude, naturalness, or primitive/unconfined recreation over an area of approximately 72,000 acres (or 1.6% of the planning area) for the life of production fields and pipelines.	**First Sale:** As compared to Alternative A, there would be an increase of approximately 500 acres to 2,000 acres in adverse, short-term impacts to recreation values from activities other than oil and gas exploration and development. As compared to Alternative B, short-term impacts from ongoing oil and gas exploration activities would increase from approximately 9,000 acres impacted to approximately 17,500 acres. The greening of vegetation resulting from ice pads, roads, airstrips, and compacted snow would increase to about 750 acres, a 250-acre increase from Alternative B. Seismic operations would result in several hundred miles of green trails with likely increases over Alternative B directly corresponding to increases is seismic operations. Oil and gas development would result in the long-term loss of scenic quality, solitude, naturalness, or primitive/unconfined recreation over an area of approximately 82,000 acres (or 1.8% of the planning area) for the life of production fields and pipelines. This is 10,000 acres more than under Alternative B.
	Multiple Sales: Long-term impacts would increase about 40 percent over those of the first sale, ultimately affecting about 90,000 acres or 1.9 percent of the planning area.	**Multiple Sales**: Long-term impacts will accumulate and increase about 45 percent above those of the first sale, ultimately affecting approximately 170,000 acres or about 2.3 percent of the planning area.

TABLE II.D-2

SOILS		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: Estimated areas of impacts and losses of soils from all activities are similar to those areas discussed under Vegetation (Sec. IV.E.6).	**First Sale:** Estimated areas of impacts and losses of soils from all activities are similar to those areas discussed under Vegetation (Sec. IV.F.6).	**First Sale**: Soil stability depends closely on vegetative cover; where vegetation is disturbed, impacts on soils follow. All activities under the Preferred Alternative must disturb the least possible amount of surface area and vegetation; Stipulation 68 always must be complied with. Emphasis is on maintaining the thermal properties of the existing vegetation and surface organic mat or substituting other thermal insulation. Impacts to soils from management actions under the Preferred Alternative would involve either disturbance or destruction of relatively small areas. The duration of these impacts may be short term, ranging from several years if the vegetation is disturbed, and up to many decades if the soils are destroyed. Relatively, the overall impact to soils in the planning area is expected to be a small fraction of the total of more than 4 million acres in the entire planning area. The area of impacted soils would be similar to that of disturbed vegetation (see Vegetation, Sec. IV.G.6, for acreage details). More site-specific conclusions will follow project design and detailed soil survey.
Multiple Sales: Areas of impacts and losses of soils from all activities in multiple sales are similar to those areas discussed under Vegetation (Sec. IV.E.6).	**Multiple Sales**: Areas of impacts and losses of soils from all activities in multiple sales are similar to those areas discussed under Vegetation (Sec. IV.F.6).	**Multiple Sales**: Areas of impacts and losses of soils from all activities in multiple sales would be similar to those areas discussed under Vegetation (Sec.IV.G.6).
PALEONTOLOGICAL RESOURCES		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: Under Alternative D, impacts to paleontological resources from management activities other than oil and gas exploration and development would be similar in nature but may be significantly increased in magnitude over Alternative B. Under Alternative D, most of the impacts to paleontological resources would result from oil and gas exploration and development. When compared with Alternative B, the potential for impact to paleontological resources would be significantly greater under Alternative D.	**First Sale:** Alternative E opens all of the planning area to oil and gas leasing. Under Alternative E, impacts to paleontological resources from management activities other than oil and gas exploration and development would be similar in nature but may be significantly increased in magnitude over Alternative B.	**First Sale:** Under the Preferred Alternative, impacts to vertebrate paleontological resources from management activities other than oil and gas exploration and development would be minimal. Most of the potential impacts to vertebrate paleontological resources would result from oil and gas exploration and development activities and have already been discussed.
Multiple Sales: Under Alternative D, potential impacts to paleontological resources from management activities other than oil and gas exploration and development would be similar in nature to Alternative B, but the probability of impacts occurring would increase. Under Alternative D, the potential impacts to paleontological resources from oil and gas exploration and development would increase by at least 300 percent compared to Alternative B.	**Multiple Sales**: Under Alternative E, potential impacts to paleontological resources from management activities other than oil and gas exploration and development would be similar in nature to Alternative B, but the probability of impacts occurring would increase. Under Alternative E, the potential impacts to paleontological resources from oil and gas exploration and development would increase by at least 400 percent compared to Alternative B.	**Multiple Sales**: The types and nature of impacts to vertebrate paleontological resources resulting from multiple lease sales are the same as described for a single sale. The potential impacts to vertebrate paleontological resources from management activities other than oil and gas exploration and development would be similar in nature to what has been mentioned previously; however, the probability of impacts occurring may increase with multiple sales. As a result of multiple sales, the potential impacts to vertebrate paleontological resources from oil and gas exploration and development could increase severalfold.
WATER RESOURCES		
Alternative D	**Alternative E**	**Preferred Alternative**

First Sale: The impacts of activities other than oil and gas exploration and development under Alternative D are expected to be similar to those under Alternative B and C. The potential long-term impacts (melting of permafrost, and disrupting drainage patterns) and short-term impacts (increasing erosion and sedimentation and removing water from riverine pools and lakes) of oil and gas exploration and development on the water resources in the planning is expected to be greater for Alternative D than for Alternatives B and C.	**First Sale:** The impacts of activities other than oil and gas exploration and development under Alternative E are expected to be similar to those under Alternative A (and similar to those under Alternatives B, C, and D). The potential long-term impacts (melting of permafrost and disrupting drainage patterns) and short-term impacts (increasing erosion and sedimentation and removing water from riverine pools and lakes) of oil and gas exploration and development on the water resources in the planning is expected to be greater for Alternative E than for Alternatives B, C, and D.	**First Sale:** The impacts of activities other than oil and gas exploration and development under the Preferred Alternative are expected to be similar to those under Alternative A. The potential long-term impacts of oil and gas development activities on the water resources in the planning area include disturbance of stream banks or shorelines and subsequent melting of permafrost (thermokarst) and blockages of natural channels and floodways that disrupt drainage patterns. The potential short-term impacts, primarily during construction, would increase erosion and sedimentation and water removal from riverine pools and lakes. While any surface-disturbing activity could affect water resources, the potential adverse effects of the Preferred Alternative, because it has a restricted leasing area and surface occupancy limitations that excludes the critical lake and river habitat from leasing or occupancy, these effects, while significant, could be minimized.
Multiple Sales: Adverse impacts from multiple lease sales may be up to several times greater than a single sale, while indirect impacts may take years to develop. Shared infrastructure could reduce the adverse effects to water resources of multiple lease sales, because combined facilities require less water for construction, maintenance, and camp use than separate, independent facilities. Where infrastructure is not shared, both long and short-term impacts, and recovery times could increase.	**Multiple Sales**: Adverse impacts from multiple lease sales may be up to several times greater than a single sale, while indirect impacts may take years to develop. Shared infrastructure could reduce the adverse effects to water resources of multiple sales, because combined facilities require less water for construction, maintenance, and camp use than separate, independent facilities. Where infrastructure is not shared, both long and short-term impacts, and recovery times could increase.	**Multiple Sales**: Adverse impacts from multiple lease sales may be up to several times greater than a single sale, while indirect impacts may take years to develop. Shared infrastructure could reduce the adverse effects to water resources of multiple lease sales, because combined facilities require less water for construction, maintenance, and camp use than separate, independent facilities. Where infrastructure is not shared, both long and short-term impacts, and recovery times could increase.
WATER QUALITY		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: Effects under Alternative D are higher than in Alternative B for oil and gas activities. Effects for activities other than oil and gas are similar to those for Alternative A. Water quality up to 2,000 acres could be affected by construction or placement of ice or gravel roads and other structures. Oil spills could result in waters of up to 13 ponds or small lakes remaining toxic to sensitive species for about 7 years. Water quality could be degraded over a few weeks along a short stretch of the Colville from a 325-bbl spill. The spreading of a similar-sized spill over about 60 acres of Teshekpuk Lake (0.03% of the lake surface) for a few weeks could be considered an effect on water quality.	**First Sale:** Effects of oil and gas activities in Alternative E would be higher than in Alternative B. Effects of other activities would be similar to those in Alternative A. Long- term water quality over >3,000 acres could be affected by construction or placement of gravel roads, and other structures. Oil spills could result in waters of up to 18 ponds or small lakes remaining toxic to sensitive species for about 7 years. Water quality could be degraded over a few weeks along a short stretch of the Colville from a 325-bbl spill. The spreading of a similar-sized spill over about 60 acres of Teshekpuk Lake (0.03% of the lake surface) for a few weeks could be considered an effect on water quality. Tankering of oil is projected to result in a most likely number of zero to one spills Æ1,000 bbl along multiple TAPS tanker routes. Such a spill would contaminate receiving water over several tens of square miles to levels above chronic criteria but below acute criteria.	**First Sale:** Longer-term (decade-or-more) effects of this alternative would occur over a few hundred acres because of the introduction of oil and gas activities construction or placement of ice roads. Oil spills could result in waters of about one to seven ponds or small lakes remaining toxic to sensitive species for about 7 years. Water quality could be degraded over a few weeks along a short stretch of the Colville from a 325-bbl spill. The spreading of a similar-sized spill over about 60 acres of Teshekpuk Lake (0.03% of the lake surface) for a few weeks could be considered an effect on water quality.
Multiple Sales: Longer-term (decade-or-more) effects of multiple sales would slightly greater than for a single sale. Oil spills could result in waters of up to 27 ponds or small lakes remaining toxic to sensitive species for about 7 years. Water quality could be degraded over a few weeks along a short stretch of the Colville from a 325-bbl spill. The spreading of a similar-sized spill over about 60 acres of Teshekpuk Lake (0.03% of the lake surface) for a few weeks could be considered an effect on water quality. A spill along the TAPS tanker route could contaminate receiving water over several tens of square miles to levels above chronic criteria but below acute criteria.	**Multiple Sales**: Longer term (decade-or-more) effects of multiple sales would be one-third greater than for a single sale. Oil spills could result in waters of up to 36 ponds or small lakes remaining toxic to sensitive species for about 7 years. Water quality could be degraded over a few weeks along a short stretch of the Colville from a 325-bbl spill. The spreading of a similar-sized spill over about 60 acres of Teshekpuk Lake (0.03% of the lake surface) for a few weeks could be considered an effect on water quality. The œ2 most likely number of tanker spills along TAPS routes could individually contaminate receiving water over several tens of square nautical miles to levels above chronic criteria but below acute criteria.	**Multiple Sales**: Longer-term (decade-or-more) effects of multiple sales would be similar to those for a single sale. Oil spills could result in waters of up to 10 ponds or small lakes remaining toxic to sensitive species for about 7 years. Water quality could be degraded over a few weeks along a short stretch of the Colville from a 325-bbl spill. The spreading of a similar-sized spill over about 60 acres of Teshekpuk Lake (0.03% of the lake surface) for a few weeks could be considered an effect on water quality.

TABLE II.D-2

AIR QUALITY		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: Effects of oil and gas activities under Alternative D are similar to those under Alternative C. Annually, air quality would be affected by drilling and construction activities at levels less than the PSD criteria. Effects of activities other than oil and gas are negligible, as in Alternative A.	**First Sale:** Effects of oil and gas activities under Alternate E would be similar to those under Alternative D. Annually, air quality would be affected by drilling and construction activities at levels less than the PSD criteria. Effects of activities other than oil and gas would be negligible, the same as under Alternative A.	**First Sale:** Activity associated with the Preferred Alternative would result in a small, localized increase in the concentrations of criteria pollutants. Concentrations would be within the PSD Class II limits and National Air Quality Standards. Therefore, effects from the Preferred Alternative would be low. Effects of activities other than oil and gas are negligible, as in Alternative A.
Multiple Sales: Activities associated with multiple sales would result in sequential effects which would remain small and localized. Concentrations would remain within the PSD Class II limits and effects would remain low.	**Multiple Sales**: Activities associated with multiple sales would result in sequential effects which would remain small and localized. Concentrations would remain within the PSD Class II limits and effects would remain low.	**Multiple Sales**: Activities associated with multiple sales would result in sequential effects which would remain small and localized. Concentrations would remain within the PSD Class II limits and effects would remain low
VEGETATION		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: Impacts to vegetation from activities other than oil exploration and development under Alternative D would be the same as those under Alternative A, except that the effects of archaeological excavation might increase from 1 to 5 acres. The impacts of oil exploration and development would be of the same types as for Alternative B, but greater in areal extent. The maximum acreage affected by 3-D seismic surveys would increase from 0 to 92,000 acres to 92,000 to 322,000 acres. The combined effect of development activities would cause the destruction of vegetation on 140 to 600 acres rather than 0 to 180 acres and the alteration in plant species composition of another 220 to 940 acres instead of 0 to 280 acres, for a total of effects over 360 to 1,540 acres rather than 0 to 460 acres. Finally, the occurrence of spills would increase, affecting 1.4 to 6.0 acres instead of 0.5 to 2.6 acres, but the probability of a blowout would remain low.	**First Sale:** Impacts to vegetation from activities other than oil exploration and development under Alternative E would be the same as those under Alternative A, except that the effects of archaeological excavation might increase from 1 to 6 acres. The impacts of oil exploration and development would be of the same types as for Alternative B, but greater in areal extent. The maximum acreage affected by 3-D seismic surveys would increase from 0 to 92,000 acres to 92,000 to 460,000 acres. The combined effect of development activities would cause the destruction of vegetation on 140 to 780 acres rather than 0 to 180 acres and the alteration in plant species composition of another 220 to 1,220 acres instead of 0 to 280 acres, for a total of effects over 360 to 2,000 acres rather than 0 to 460 acres. Finally, the occurrence of oil spills would increase, and the probability of a seawater pipeline spill would also increase.	**First Sale:** Impacts to vegetation from activities other than oil exploration and development under the Preferred Alternative would involve either disturbance or destruction. Since they would involve a very small fraction of the 4.6-million-acre planning area, the overall impact to vegetation communities would be minor to negligible. The impacts of oil exploration would include vegetation disturbance on about 7,350 acres per year from 2-D seismic work and 46,000 to 138,000 acres from 3-D surveys over the entire exploration period. About 17 percent of the disturbance from 2-D would be medium to high, with perhaps 20 percent at that level for 3-D. After 9 years, recovery would be about 90 percent for 2-D seismic work and probably somewhat less for 3-D. Exploration activities also would result in minor vegetation destruction and alteration from the construction of exploration well collars that would be permanent. The activities of oil field development that would impact vegetation include construction of gravel pads, roads, and airstrips for each oil field; potential construction of one pump station within the planning area; excavation of material sites; and construction of pipelines. The combined effect of these activities would cause the destruction of vegetation on 140 to 320 acres and the alteration in plant species composition of another 220 to 500 acres, for a total of effects over 360 to 820 acres. The duration of these impacts would be permanent, assuming that the gravel pads would remain after oil production ends, and recovery thus would be moot. Oil spills are inevitable during exploration and development and would affect 0.7 to 3.1 acres of vegetation within the planning area. Spills would be cleaned up immediately, would cause minor ecological damage, and ecosystems would be likely to recover in a few years to 2 decades. Overall, the impacts of the Preferred Alternative would be very similar to those of Alternative C.

TABLE II.D-2

Multiple Sales: The impacts of oil exploration would include more vegetation disturbance from seismic work than under a single-sale scenario, but the extended period of time over which it would occur, coupled with the recovery time for disturbed areas, would result in a small increase in the amount of disturbance that would be evident at any one time. Exploration activities would also result in 0.1 to 0.5 acres of permanent vegetation destruction around well collars and alteration of 0.6 to 2.0 acres around ice pads. The activities of oil field development that would impact vegetation include construction of gravel pads, roads, and airstrips for each oil field; potential construction of one pump station within the planning area; excavation of material sites; and construction of pipelines. The combined effect of these activities would cause the destruction of vegetation on 280 to 1,020 acres and the alteration in plant species composition of another 440 to 1,600 acres, for a total of effects over 720 to 2,620 acres. The duration of these impacts would be permanent, assuming that the gravel pads would remain after oil production ends, and recovery thus would be moot. Oil spills would affect 2.7 to 12.0 acres of vegetation within the planning area. Recovery from spills would take a few years to 2 decades. The probability of a blowout would remain low.	**Multiple Sales**: The impacts of oil exploration would include more vegetation disturbance from seismic work than under a single-sale scenario, but the extended period of time over which it would occur, coupled with the recovery time for disturbed areas, would result in a small increase in the amount of disturbance that would be evident at any one time. Exploration activities would also result in 0.2 to 0.6 acres of permanent vegetation destruction around well collars and alteration of 0.7 to 2.7 acres around ice pads. The activities of oil field development that would impact vegetation include construction of gravel pads, roads, and airstrips for each oil field; potential construction of up to two pump stations within the planning area; excavation of material sites; and construction of pipelines. The combined effect of these activities would cause the destruction of vegetation on 280 to 1,480 acres and the alteration in plant species composition of another 440 to 2,320 acres, for a total of effects over 720 to 3,800 acres. The duration of these impacts would be permanent, assuming that the gravel pads would remain after oil production ends, and recovery thus would be moot. Oil spills would affect 3.7 to 16.0 acres of vegetation within the planning area. Recovery from spills would take a few years to 2 decades.	**Multiple Sales**: The impacts of oil exploration would include more vegetation disturbance from seismic work than under a single-sale scenario, but the extended period of time over which it would occur, coupled with the recovery time for disturbed areas, would result in only a small increase in the amount of disturbance that would be evident at any one time. Exploration activities also would result in 0.1 to 0.2 acres of permanent vegetation destruction around well collars and alteration of 0.3 to 1.0 acres around ice pads. The activities of oil field development that would impact vegetation include construction of gravel pads, roads, and airstrips for each oil field; potential construction of one pump station within the planning area; excavation of material sites; and construction of pipelines. The combined effect of these activities would cause the destruction of vegetation on 140 to 460 acres and the alteration in plant species composition of another 220 to 720 acres, for a total of effects over 360 to 1,180 acres. The duration of these impacts would be permanent, assuming that the gravel pads would remain after oil production ends, and recovery thus would be moot. Oil spills would affect 0.9 to 7.4 acres of vegetation within the planning area. Recovery from spills would take a few years to two decades. Overall, the impacts of the Preferred Alternative would be very similar to those of Alternative C.
FISH RESOURCES		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: The effect of fuel spills on arctic fish populations in Alternative D are expected to be similar to Alternative A. The individual effects of seismic surveys, construction related activities, and oil and seawater spills are expected to be similar to that of Alternative B. However, the likelihood of their occurrence is estimated to be roughly four to five times higher for Alternative D than for Alternative B. Depending on the actual level and location of implementation, this could result in a corresponding increase in the overall effect of these activities on arctic fish populations in Alternative D over that of Alternative B.	**First Sale:** The effect of fuel spills on arctic fish populations in Alternative E are expected to be similar to Alternative A. The individual effects of seismic surveys, construction-related activities, and oil and seawater spills are expected to be similar to that of Alternative B. However, the likelihood of their occurrence is estimated to be roughly five to six times higher for Alternative E than for Alternative B. Depending on the actual level and location of implementation, this could result in a corresponding increase in the overall effect of these activities on arctic fish populations in Alternative E over that of Alternative B.	**First Sale:** Based on the assumptions discussed in the text, seismic surveys, construction (drill pads, roads, airstrips, pipelines, and gravel extraction); and fuel, oil, and seawater spills associated with the Preferred Alternative are not expected to have a measurable effect on arctic fish populations, and would be similar to that of Alternative C.
Multiple Sales: Seismic surveys and pipelines associated with multiple sales are expected to have the same overall effect on arctic fish as the first sale. Gravel pads are expected to have about twice the effect as the first sale. Fuel and oil spills are likely to have a greater effect on arctic fish than the first sale. Insufficient recovery time between sales and/or greater levels of activity would be likely to result in greater effects than estimated herein for multiple sales.	**Multiple Sales**: Seismic surveys and pipelines associated with multiple sales are expected to have the same overall effect on arctic fish as the first sale. Gravel pads are expected to have about twice the effect as the first sale. Fuel and oil spills are likely to have a greater effect on arctic fish than the first sale. Insufficient recovery time between sales and/or greater levels of activity would be likely to result in greater effects than estimated herein for multiple sales.	**Multiple Sales**: Seismic surveys, pipelines, and seawater pipeline spills are expected to have the same overall effect on arctic fish as the first sale. Gravel pads, gravel extraction, and fuel and oil spills are expected to have a slightly greater effect on arctic fish populations than the first sale. Insufficient recovery time between sales and/or greater levels of activity would be likely to result in greater oil spill related effects than estimated herein for multiple sales.
BIRDS		
Alternative D	**Alternative E**	**Preferred Alternative**

First Sale: Effects of actions other than oil and gas activity under Alternative D are expected to be essentially the same as for Alternative B, except in the Colville River corridor where increased activity would result in substantially greater effects. Effects of oil and gas activity are expected to be 2-3x greater than discussed for Alternative B; this does not represent a significantly greater effect for any species. As a result of their small average size, onshore oil spills reaching aquatic habitats are expected to cause losses of tens of individuals, but the effect of such losses may not be detectable above the natural fluctuations of the population. A crude-oil spill from an offshore site in the marine environment during August or September could contact loons and flocks of brant, oldsquaw, and/or eiders staging in protected coastal habitats or waters farther offshore. Some broodrearing, molting, or staging Brant, Canada Geese, Snow Geese, Oldsquaw, King Eiders, and Common Eiders could be contacted in coastal habitats. Mortality of molting Oldsquaw could be substantial, but the effect would be difficult to determine due to an uncertain population status. Because of an apparently declining population, substantial King Eider mortality could be significant. Also, several thousand shorebirds could encounter oil in shoreline habitats. A spill that enters open water off river deltas in spring, or nearshore areas in fall, could contact migrant loons and eiders.	**First Sale:** Effects of actions other than oil and gas activity under Alternative E are expected to be essentially the same as for Alternative B (minor), except in the Goose Molting Habitat LUEA where increased activity could result in greater effects. Effects of routine oil and gas activities are expected to be substantially greater than discussed for Alternative B as a result of offering this LUEA for lease. Long-term effects on molting populations are uncertain because long-term studies have not been done. Oil spill effects are expected to be considerably greater than under Alternative B because of the potential for a spill entering a lake occupied by molting geese. However, because the location of facilities and activities relative to bird concentrations is speculative, the potential effect is difficult to determine. As a result of their small average size, onshore oil spills reaching aquatic habitats are expected to cause losses of tens of individuals, but potentially 100's of individuals could be killed by cumulative total mortality from many small spills. The effect of such losses may not be detectable above the natural fluctuations of the population. A fuel-oil spill from a barge or a crude-oil spill from an offshore site during August or September could contact loons and large flocks of brant, oldsquaw, and/or eiders staging in protected coastal habitats or waters farther offshore. Effects on individual birds would be the same as described for Alternative B. Some broodrearing, molting, or staging Brant, Canada Geese, Snow Geese, Oldsquaw, King Eiders, and Common Eiders could contact oil in protected coastal habitats or waters farther offshore. Mortality of molting Oldsquaw could be substantial, but the effect would be difficult to determine due to their uncertain population status. Because of an apparently declining population, substantial King Eider mortality could be significant. Common eiders, nesting on barrier islands and along the coastal, could be contacted by a marine spill. Also, several thousand shorebirds could encounter oil in shoreline habitats. A spill that enters open water off river deltas in spring, or nearshore areas in fall, could contact migrant loons and eiders. Raptors are expected to experience minor effects under this alternative.	**First Sale:** Under the Preferred Alternative, most disturbance effects not associated with oil and gas activities are expected to be localized and temporary, ranging from brief (<1 day) in the case of response to a few aircraft flights or presence of ground or boat activity to several months for extended ground-transport operations, although lost productivity decreased survivorship of nesting species is not likely to be detectable above the natural fluctuations of the population. Although more intense activity, such as the combination of large camp activity and associated aircraft operations, substantially increased river-boat traffic, fuel spills entering lakes with substantial waterfowl populations, or potential attraction of predators to these sites is expected to result in more substantial losses, population-level effects still would be considered minor. Even with greater losses in the latter circumstances, recovery of lost productivity and recruitment probably will not be detectable above the natural fluctuations of the population. Fuel spills are expected to be contained and cleaned up while on gravel structures. Losses of tens of individuals are expected if a fuel spill of the small estimated average size enters a lake populated with molting waterfowl. Most raptors exposed to disturbance factors at distances œ_ mi are expected to exhibit minor behavioral changes. Overall effect of aircraft operations supporting oil and gas activities, and most other activities causing disturbance, on productivity or recruitment of bird populations in the vicinity of drill sites is expected to be localized and minor and may not be detectable above the natural fluctuations of the population. Displacement of nesting birds from gravel structures and pits is expected to have primarily minor local effects on productivity, because displaced individuals may use undisturbed habitats, although probably with variable success. Current data are inadequate for predicting the ultimate effect of this and other disturbance factors for most species and areas. Given the small areas and low-density local populations involved, population-level effects are expected to be minor. Effect of other habitat alterations is expected to be minor except in the proximity of roads, where populations of most nesting species are likely to decline. As a result of their small average size, oil spills reaching aquatic habitats are expected to cause losses of tens of individuals, but the effect of such losses is not likely to be detectable above the natural fluctuations of the population. An oil spill entering Teshekpuk Lake or the Colville River is expected to cause no greater than minor effects on waterfowl and/or raptors. Because overall effects of management actions on birds in the Northeast NPR-A Planning Area are expected to be minor, effects on stakeholder groups also are expected to be minor. Effects under the Preferred Alternative are expected to be **a)** *significantly greater* than effects under Alternative *A*; **b)** *slightly greater* than effects under Alternative *B*; **c)** *less* than effects under Alternative *C*; **d)** *considerably less* than effects under Alternative *D*; **e)** *significantly less* than under Alternative *E*.

TABLE II.D-2

BIRDS		
Alternative D	**Alternative E**	**Preferred Alternative**
Multiple Sales: Displacement of birds from disturbance and habitat alteration or loss is expected to increase in developed areas that may occur in most of the planning area under Alternative D with multiple sales, substantially changing planning area local bird population levels and/or distribution. Increases in oil and refined oil spills are expected to result in greater loss of numbers of birds than under the first sale, but these losses are not likely to be detectable above the natural fluctuations of the population and survey methods/data available. Overall effect is expected to increase substantially from that discussed for the first sale.	**Multiple Sales**: Displacement of birds from disturbance and habitat alteration or loss is expected to increase substantially where development and production facilities are located. This could occur in numerous portions of the planning area if multiple sales are held, potentially altering local populations in these areas and for species that appear more vulnerable to habitat changes or disturbance (e.g., loons, molting geese) effects could extend to regional populations and involve long-term changes in distribution. However, most effects that are likely to occur throughout the planning area are expected to be short-term and minor. Increases in oil and refined oil spills are expected to result in the loss of substantial numbers of birds, but these losses and recovery of cumulative lost productivity and recruitment may not be detectable above the natural fluctuations of the population and survey methods/data available. Overall effect is expected to increase substantially from that discussed for the first sale.	**Multiple Sales**: Displacement of birds from disturbance and habitat alteration is expected to increase slightly in the southern two-thirds of the planning area under the Preferred Alternative with multiple sales but still not significantly affect coastal plain populations. Increases in crude and refined oil spills are expected to result in the loss of small numbers of birds that is not likely to be detectable above the natural fluctuations of the population and survey methods/data available. Overall effect is expected to increase somewhat from that discussed for the first sale.
TERRESTRIAL MAMMALS		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: Activities other than oil and gas are expected to increase somewhat under Alternative D as compared to Alternative A, but the increase is not expected to affect terrestrial mammal populations. For oil and gas activities, effects of Alternative D are expected to be significantly greater than those of Alternative B, with more helicopter disturbance of caribou and other terrestrial mammals. Increased habitat alteration would include the development of one to four oil fields and a pipeline to the TAPS. Some CAH and TLH caribou are expected to be disturbed and their movements delayed along the pipeline during periods of air traffic. Near the oil fields, surface, air, and foot traffic are expected to increase and to displace some terrestrial mammals, but not significantly affect Arctic Slope populations. If a field is developed in the area south and west of Teshekpuk Lake, some TLH caribou calving is expected to be displaced within 1.86 to 2.48 mi (3-4 km) of roads and other production facilities over the life of the project. The number of small, chronic crude-oil and fuel spills including a potential oil spill contacting Teshekpuk Lake or the Colville River, are likely to result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 to 2 years. Trenching for and burial of pipelines at river crossings would have very local effects on tundra and riparian vegetation and would not significantly affect terrestrial mammal habitats. Under Alternative D, some terrestrial mammals could be affected by possible oil exploration offshore from an ice island and subsequent oil development on the coast of the NPR-A in Harrison Bay from about Kogru Inlet south to a small area south of Atigaru Point (Figure II.C.1-4). Effects of these activities would be local and are not likely to affect terrestrial mammal populations.	**First Sale:** other than oil and gas are expected to increase somewhat under Alternative E compared to Alternative A, but the increase is not expected to affect terrestrial-mammal populations. For oil and gas activities, effects of Alternative E are expected to be significantly greater than those of Alternative B, with more helicopter disturbance of caribou and other terrestrial mammals. Increased habitat alteration would include the development of one to five oil fields and a pipeline to the TAPS. Some CAH and TLH caribou are expected to be disturbed and their movements delayed along the pipeline during periods of air traffic. Near the oil fields, surface, air, and foot traffic is expected to increase significantly and to displace some terrestrial mammals but not significantly affect Arctic Slope populations. If a field is developed in TLH caribou-calving areas, some calving is expected to be displaced within 1.86 to 2.48 mi (3- 4 km) of roads and other production facilities over the life of the project. The number of small, chronic crude-oil and fuel spills including a potential oil spill contacting Teshekpuk Lake or the Colville River, are expected to result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year. Trenching for and burial of pipelines at river crossings would have very local effects on tundra and riparian vegetation and wouldn't significantly affect terrestrial mammal habitats. Under Alternative E, some terrestrial mammals could be affected by possible oil exploration offshore from an ice island and subsequent oil development on the coast of the NPR-A (Fig. II.C.1-4). Effects of these activities would be local and are not likely to affect terrestrial mammal populations.	**First Sale:** For activities other than oil and gas, air traffic, humans on foot, and the presence of resource-inventory-survey camps are expected to be local, within about 1 to 2 km of activities, and short term, with no significant adverse effects on mammal populations (except the arctic fox, which may increase in abundance near permanent camp facilities). For oil and gas activities, caribou of the CAH, WAH, and TLH could be temporarily disturbed and their movements delayed along the pipeline during periods of air overflights, but these disturbances are not expected to affect migrations and overall distribution and habitat use. The TLH caribou calving and migration movements in the Teshekpuk Lake area would not be affected by leasing under the Preferred Alternative. Near oil field facilities south of Teshekpuk Lake, surface, air, and foot traffic would temporarily displace some caribou, moose, muskoxen, grizzly bears, wolves, and wolverines but not significantly affect Arctic Slope populations. Small, chronic crude-oil and fuel spills and a potential spill contacting Teshekpuk Lake or reaching the Colville River might result in the loss of small numbers of terrestrial mammals, with recovery expected within about 1 year. Trenching for and burial of pipelines at river crossings would have very local effects on tundra and riparian vegetation and would not significantly affect terrestrial mammal habitats. Under the Preferred Alternative, some terrestrial mammals could be affected by possible oil exploration offshore from an ice island and subsequent oil development on the coast of the NPR-A in Harrison Bay in a small area south of Atigaru Point (Fig. II.C.1). Effects of these activities would be local and are not likely to affect terrestrial mammal populations.

Multiple Sales: The effect of multiple sales under Alternative D is expected to result in an increase in the amount of displacement of calving TLH caribou within 1.86 to 2.48 mi (3-4 km) of field roads assumed to be built between production pads south of Teshekpuk Lake. This effect is expected to persist over the life of the oil fields and may reduce productivity and abundance of the TLH caribou. Some increase in the impedance of TLH caribou movements to insect-relief areas along the coast, north of Teshekpuk Lake is expected under multiple sales. The number of small, chronic crude- and fuel-oil spills is expected to increase and result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year.	**Multiple Sales**: The effect of multiple sales under Alternative E is expected to result in an increase in the amount of displacement of calving TLH caribou within 1.86 to 2.48 mi (3-4 km) of within-field roads. This effect is expected to persist over the life of the oil fields and may reduce productivity and abundance of the TLH. Some increase in the impedance of TLH caribou movements to insect relief areas along the coast, north of Teshekpuk Lake is expected under multiple sales. The number of small, chronic crude-oil and fuel spills is expected to increase and result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year.	**Multiple Sales**: Surface, air, and foot traffic near the oil fields is expected to increase and to displace some terrestrial mammals but not significantly affect Arctic Slope populations. The number of small, chronic crude-oil and fuel spills is expected to increase somewhat and result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year.
MARINE MAMMALS		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: For marine mammals, the effects of activities other than oil and gas under Alternative D are expected to be similar to those under Alternative A—local and short term, with no significant adverse effects to the populations as a whole. The effects of oil and gas activities for Alternative D are expected to increase over the effects of Alternative B. Although most of the increase in human activities associated with oil exploration and development is expected to occur inshore, south of the coast, some increase in potential noise and disturbance effects are expected to occur in the Colville River Delta-southern Harrison Bay area. A small number of seals and no more than a few polar bears might be adversely affected or killed by a 325-bbl crude-oil spill contacting the Colville River and some of the oil reaching marine waters but, these losses would not be significant to marine mammal populations. Under Alternative D, seals and polar bears could be affected by possible oil exploration offshore from an ice island and subsequent oil development on the coast of the NPR-A in Harrison Bay from about Kogru Inlet south to a small area south of Atigaru Point (Figure II.C.1-4). Effects of these activities would be local and are not likely to affect marine mammal populations.	**First Sale:** For marine mammals, the effects of activities other than oil and gas under Alternative E are expected to be similar to those under Alternative A—local and short term, with no significant adverse effects to the populations as a whole. The effects of oil and gas activities for Alternative E are expected to increase over the effects of Alternative B. Although most of the increase in human activities associated with oil exploration and development is expected to occur inshore, south of the coast, some increase in potential noise and disturbance and oil pollution effects is expected to occur along the coast. A small number of seals and no more than a few polar bears might be adversely affected or killed by a 325-bbl crude-oil spill contacting the Colville River, but these losses would not be significant to marine mammal populations. Under Alternative E, seals and polar bears could be affected by possible oil exploration offshore from an ice island and subsequent oil development on the coast of the NPR-A (Fig. II.C.1-4). Effects of these activities would be local and are not likely to affect marine mammal populations.	**First Sale:** For the Preferred Alternative, the effects of activities other than oil and gas are expected to be on marine mammals, particularly polar bears and seals, along the coast of the planning area and are expected to be local and occur within about 1 mi of resource-inventory-survey activities, survey and recreational camps, and overland moves. The effects of oil and gas activities are expected to result in a small increase in potential noise and disturbance along the coast, primarily in the Colville River Delta-inner Harrison Bay area, and these effects are expected to be local and short term (generally <1 year). Under the Preferred Alternative, seals and polar bears could be affected by possible oil exploration offshore from an ice island and subsequent oil development on the coast of the NPR-A in Harrison Bay in a small area south of Atigaru Point (Fig. II.C.1). Effects of these activities would be local and are not likely to affect marine mammal populations. A small number of seals and no more than a few polar bears might be adversely affected or killed by a 325-bbl crude-oil spill contacting the Colville River, but these losses would not be significant to marine mammal populations. The effects of the Preferred Alternative are expected to be short term, with no significant adverse effects on marine mammal populations.
Multiple Sales: Multiple sales under Alternative D are expected to have effects similar to those under Alternative D with the first sale, i.e., local and short term, with no significant adverse effects to marine mammal populations as a whole.	**Multiple Sales**: Multiple sales under Alternative E are expected to have similar effects to those under Alternative E in the first sale, i.e., local and short term, with no significant adverse effects to marine mammal populations as a whole.	**Multiple Sales**: Conclusion—Multiple Sales: The effect of oil and gas activities under the Preferred Alternative with multiple sales is expected to be about the same as for the single sale, but the duration and extent of activities would be over a longer period of time, as would potential disturbance effects.
ENDANGERED AND THREATENED SPECIES		
Potential effect common to all Alternatives: Disturbance, depending on the nature and duration of the disturbance, could be considered a "take" under the ESA.		
Alternative D	**Alternative E**	**Preferred Alternative**

First Sale: The potential effects on bowhead whales from discharges, noise and disturbance, seawater spills, and oil spills are expected to be essentially the same under this alternative as under Alternative B. The potential effects on spectacled and Steller's eiders from discharges, some noise and disturbance, and oil spills associated with oil and gas activities are expected to be essentially the same under this alternative as under Alternative B. Some mortality of spectacled eiders could occur if spilled oil managed to reach Teshekpuk Lake, although eiders appear to be present in low densities during the breeding season. Little information is available for the rest of the season. Most spectacled eider breeding and nesting areas are protected under this alternative, because no oil and gas activities are permitted in most of the sensitive area. Some eiders in the area open to oil and gas activities may experience temporary, nonlethal effects as a result of increased aircraft traffic, vessel traffic, and perhaps drilling of development and production wells and oil-spill-cleanup activities. Some Steller's eider breeding and nesting areas also would be protected under this alternative, although some eiders in the remainder of the planning area may experience some noise and disturbance as a result of oil and gas activities and may experience temporary, nonlethal effects lasting probably less than an hour but possibly continuing all summer in the case of summer drilling operations. There also may be an increase in potential effects on eiders from activities associated with the management plan other than oil and gas activities, due to an increase in summertime aircraft flights over sensitive areas, that may affect nesting females and their broods. Under this alternative there would be an increase in the number of aircraft flights for aerial wildlife surveys and other aerial surveys. Aerial wildlife surveys in late June and early July increase from 14 days to 21 days. Spectacled and Steller's eiders breeding, nesting, or rearing young in coastal habitats may be overflown by support aircraft and may experience temporary, nonlethal effects lasting probably less than an hour. In the central portion of the planning area, Steller's eiders may occasionally be overflown by support aircraft and may experience temporary, nonlethal effects lasting probably less than an hour. It is unlikely that the primary Alaskan nesting area, located south and southeast of Barrow, would be affected much by these activities; so significant disturbance of nesting or broodrearing eiders is not expected to occur. Such short-term and localized disturbances are not expected to cause significant population effects. However, disturbance of some individuals over the life of the project is expected to be unavoidable.	**First Sale:** The potential effects on bowhead whales from discharges, noise and disturbance, and oil spills are expected essentially to be the same under this alternative as under Alternative B. Some whales exposed to a fuel-oil spill could experience one or more of the following: skin contact, baleen fouling, respiratory distress caused by inhalation of hydrocarbon vapors, localized reduction in food resources, consumption of some contaminated prey items, and perhaps a temporary displacement from some feeding areas. The number of whales contacted would depend on the size, timing, and duration of the spill; the density of the whale population in the area of the spill; and the whales' ability or inclination to avoid contact with the spilled fuel oil. Some eiders exposed to a fuel-oil spill may suffer mortality as a result of hypothermia while others may ingest fuel oil from preening of oiled feathers and be prone to various pathological conditions such as endocrine dysfunction, liver-function impairment, and weight loss. The potential effects on spectacled and Steller's eiders from discharges, some noise and disturbance, seawater spills, and oil spills associated with oil and gas activities are expected essentially to be the same under this alternative as under Alternative B. Some spectacled and Steller's eiders in the planning area may be exposed to oil and gas activities and may experience temporary, nonlethal effects as a result of increased aircraft traffic, vessel traffic, and perhaps drilling of development and production wells and oil-spill-cleanup activities. There also may be an increase in potential effects on eiders from activities other than oil and gas associated with the management plan due to an increase in summertime aircraft flights over sensitive areas that may affect nesting females and their broods. Under this alternative, there would be an increase in the number of aircraft flights for aerial wildlife surveys and other aerial surveys. Aerial wildlife surveys in June and July increase from 14 days to 21 days. Spectacled and Steller's eiders breeding, nesting, or rearing young in coastal habitats may be overflown by support aircraft and may experience temporary, nonlethal effects. In the central portion of the planning area, Steller's eiders occasionally may be overflown by support aircraft and may experience temporary, nonlethal effects. It is unlikely that the primary Alaskan nesting area, located south and southeast of Barrow, would be affected much by these activities; so significant disturbance of nesting or broodrearing eiders is not expected to occur. Such short-term and localized disturbances are not expected to cause significant population effects. However, disturbance of some individuals over the life of the project is expected to be unavoidable.	**First Sale:** Bowhead whales are not likely to be affected by activities associated with the management plan. Overall, bowhead whales exposed to noise-producing activities such as marine vessel traffic and possibly aircraft overflights most likely would experience temporary, nonlethal effects. Bowheads may exhibit temporary avoidance behavior in response to vessel and aircraft activities. In general, bowheads do not appear to travel more than a few kilometers in response to a single disturbance incident. Behavioral changes as a result of exposure to vessel or aircraft traffic likely will last only a few minutes after the disturbance has left the area or the whales have passed. Overall, the effects on spectacled and Steller's eiders exposed to noise-producing activities are expected to be minimal. Spectacled eiders breeding, nesting, or rearing young in the Spectacled Eider Breeding Range west of Teshekpuk Lake and Steller's eiders breeding, nesting, or rearing young in the central portion of the planning area may be disturbed by support aircraft, noise from drilling or vehicular traffic during development/production activities in the summer, or affected by oil-spill-cleanup activities. These eiders may experience temporary, nonlethal effects, probably lasting less than an hour but possibly continuing all summer, in the case of aircraft and drilling associated with summer operations. Significant disturbance of nesting or broodrearing eiders is not expected to occur. Some mortality of spectacled eiders could occur if spilled oil managed to reach Teshekpuk Lake, although eiders appear to be present in low densities during the breeding season. Small onshore oil spills are not likely to significantly affect eiders. If a fuel-oil spill occurred in marine waters while eiders were present, some mortality would likely occur as a result of hypothermia. Some eiders could ingest fuel oil from preening of oiled feathers and be prone to various pathological conditions such as endocrine dysfunction, liver-function impairment, weight loss, etc. Improper containment or disposal of refuse at support camps could attract potential bird predators. It is possible that an increase in predators could result in the loss of eggs, chicks, or even adult eiders. Overall, spectacled and Steller's eiders are not expected to be exposed to most noise-producing activities from oil and gas operations. Any effects from exposure likely would be minimal. Some eiders may be affected by activities other than oil and gas, such as hazardous- and solid-material removal and remediation and summer aircraft flights over sensitive areas. Nesting females and their broods may experience temporary, nonlethal effects as a result of these activities. Disturbance of some individuals over the life of the project is expected to be unavoidable. Due to the relatively low density of eiders in the planning area, substantial disturbance is not expected to occur and is likely to be temporary and limited to within a few kilometers of the activities. Such short-term and localized disturbances are not expected to cause significant population effects. Disturbance, depending on its nature and duration, could be considered a "take" under the ESA. Stipulations should provide some protection to eiders during the conduct of some of these activities. Overall, the effects of the Preferred Alternative are expected to be essentially the same as Alternative D.
ENDANGERED AND THREATENED SPECIES		

Alternative D	Alternative E	Preferred Alternative
Multiple Sales: The effects of multiple sales and increased potential for noise-producing activities and oil spills on endangered and threatened species at the resource ranges and activity levels described are expected to be essentially the same as described above for the first sale.	**Multiple Sales**: effects of multiple sales and increased potential for noise-producing activities and oil spills on endangered and threatened species at the resource ranges and activity levels described are expected to be essentially the same as described above for the single sale.	**Multiple Sales**: Effects of multiple sales are expected to be essentially as described above for the first sale. Bowhead whales exposed to noise-producing activities such as marine-vessel traffic and possibly aircraft overflights most likely would experience temporary, nonlethal effects. Spectacled and Steller's eiders are not expected to be exposed to most noise-producing activities from oil and gas operations, and any effects from exposure likely would be minimal. The assumptions that oil spills would be relatively small in size, that the majority of the spills would occur on pads, and that small areas would be affected where spills occur off the pads would remain the same as for the first sale. Therefore, the effects of multiple sales and increased potential for noise-producing activities and oil spills on endangered and threatened species at the resource ranges and activity levels described are expected to be essentially the same as described above for the single sale.
ECONOMY		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: For activities other than oil and gas exploration and development for Alternative D, approximately 50 jobs for 4_ months associated with seismic surveys and recreation employment equivalent to one person working 8 months per year would be generated. For oil and gas exploration and development activities, production in Alternative D is projected to generate increases above the levels of Alternative B as follows: NSB property taxes, 2 percent ($4-$5 million); direct oil-industry employment, 500 (5 times this in additional jobs) residing in Southcentral Alaska; NSB resident employment, 1 to 2 percent; and annual revenues of $1 to $1.25 million property tax to the State, $6 to $50 million royalty to the Federal Government, $6 to $50 million royalty to the State and NSB, and $11 to $85 million severance tax to the State.	**First Sale:** Activities other than oil and gas exploration and development for Alternative E would generate recreation-field employment by 22, 1-week long float-trip parties per year (Table II.H.3.b), which is equal to one person working for 6 months each year. For oil and gas exploration and development activities for Alternative E, production in Alternative E is projected to generate increases above the levels of Alternative B as follows: NSB property taxes, 3 to 4 percent ($6 to $9 million); direct oil-industry employment, 700 (5 times this in additional jobs) residing in Southcentral Alaska; NSB-resident employment, 2 to 3 percent; and annual revenues of $1.5 to $2.25 million property tax to the State, $10 to $79 million royalty to the Federal Government, $10 to $79 million royalty to the State and NSB, and $18 to $134 million severance tax to the State.	**First Sale:** For activities other than oil and gas, the Preferred Alternative would generate approximately 50 jobs for 4_ months associated with seismic surveys and recreation-field employment, which is equal to one person working 8 months per year. Activities other than oil and gas would have no effect; production in the Preferred Alternative is projected to generate increases above the levels of Alternative B as follows: NSB property taxes, 1 percent ($1-$2 million); direct oil-industry employment, 200 to 500 during production (5 times this in additional jobs) residing in Southcentral Alaska; NSB resident employment, 1 percent; and annual revenues of $0.25 to $0.5 million property tax to the State, $1 to $8 million royalty to the Federal Government, $1 to $8 million royalty to the State and NSB, and $3 to $13 million severance tax to the State.
Multiple Sales: The effect of multiple sales for Alternative D is projected to be approximately two times that of the first sale for Alternative D.	**Multiple Sales**: The effect of multiple sales for Alternative E is projected to be approximately two times that of the first sale for Alternative E.	**Multiple Sales**: The effect of multiple sales for the Preferred Alternative is project to be approximately two times that of the first sale for the Preferred Alternative.
CULTURAL RESOURCES		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: Under Alternative D, impacts to cultural resources from management activities other than oil and gas exploration and development would be similar in nature but may be significantly increased in magnitude over Alternative B. Under Alternative D, most of the impacts to cultural resources would result from oil and gas exploration and development, although there is a possibility that no such activities would impact cultural resources sites. When compared with Alternative B, the potential for impact to cultural resources would be significantly greater under Alternative D.	**First Sale:** Alternative E opens all of the planning area to oil and gas leasing. Under Alternative E, impacts to cultural resources from management activities other than oil and gas exploration and development would be similar in nature but may be significantly increased in magnitude over Alternative A. Under Alternative E, most of the impacts to cultural resources would result from oil and gas exploration and development, although there is a possibility that no such activities (except seismic reconnaissance) would impact cultural resources sites. When compared with Alternative B, the potential for impact to cultural resources would be significantly greater under Alternative E.	**First Sale:** Under the Preferred Alternative impacts to cultural resources from management activities other than oil and gas exploration and development would be minimal. Most of the potential impacts to cultural resources would result from oil and gas exploration and development activities which have already been discussed.

Multiple Sales: Under Alternative D, potential impacts to cultural resources from management activities other than oil and gas exploration and development would be similar in nature to Alternative B, but the probability of impacts occurring would increase. Under Alternative D, the potential impacts to cultural resources from oil and gas exploration and development would increase by at least 300 percent compared to Alternative B.	**Multiple Sales**: Under Alternative E, potential impacts to cultural resources from management activities other than oil and gas exploration and development would be similar in nature to Alternative B, but the probability of impacts occurring would increase. Under Alternative E, the potential impacts to cultural resources from oil and gas exploration and development would increase by at least 400 percent compared to Alternative B.	**Multiple Sales**: The types and nature of impacts to cultural resources resulting from multiple lease sales are the same as described for a single sale. The potential impacts to cultural resources from management activities other than oil and gas exploration and development would be similar in nature to what has been mentioned previously, however the probability of impacts occurring may increase with multiple sales. As a result of multiple sales the potential impacts to cultural resources from oil and gas exploration and development could increase several fold.
SUBSISTENCE		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: Overall effects associated with Alternative D on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and Nuiqsut, and other nearby communities from oil and gas activities in the planning area as a result of impacts from disturbance and oil spills are expected to increase over Alternative B. Periodic impacts to subsistence resources are expected but no resource would become unavailable, undesirable for use, or experience overall population reductions, and there would be no significant impacts to overall subsistence harvests and harvest patterns.	**First Sale:** Overall effects associated with Alternative E on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and Nuiqsut, and other nearby communities from oil and gas activities in the planning area as a result of impacts from disturbance and oil spills are expected to increase over Alternative B. Periodic impacts to subsistence resources are expected, but no resource would become unavailable, undesirable for use, or experience overall population reductions. Overall, effects are not expected to have significant impacts on subsistence-harvest patterns in Barrow and Atqasuk, although oil-development activity under Alternative E could make Nuiqsut's pursuit of caribou more difficult for at least an entire harvest season.	**First Sale:** Overall effects associated with the Preferred Alternative on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and Nuiqsut, and other nearby communities from oil and gas activities in the planning area as a result of impacts from disturbance and oil spills are expected to periodically impact subsistence resources, but no resource would become unavailable, undesirable for use, or experience overall population reductions. The effects of the Preferred Alternative are expected to be the same as Alternative C.
SUBSISTENCE		
Alternative D	**Alternative E**	**Preferred Alternative**

Multiple Sales: Effects from multiple sales under Alternative D are expected to result in an increase in the amount of displacement of calving TLH caribou within 1.86 to 2.48 mi (3-4 km) of field roads assumed to be built between production pads south of Teshekpuk Lake. This effect is expected to persist over the life of the oil fields and may reduce productivity and abundance of the TLH. Some increase in the impedance of TLH caribou movements to insect relief areas along the coast, north of Teshekpuk Lake is expected under multiple sales. The number of small, chronic crude-oil and fuel spills is expected to increase and result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year. Based on the assumptions discussed in the text, each additional lease sale is expected to have similar effects on arctic fish as described for Alternative D. However, if there are increased levels of activity associated with future lease sales, and/or insufficient recovery time between sales, greater adverse effects than described for Alternative D are likely to occur. Increased disturbance and displacement effects and increased oil-spill risks are expected for birds, but timing of the sales again is critical to recovery. With extended intervals between sales, impacted bird populations are expected to recover from noise and disturbance effects in 1 year. The effects of multiple sales and increased potential for noise-producing activities and oil spills on bowhead whales at the resource ranges and activity levels described are expected to be the same as described for Alternative B. Effects to marine mammal populations as a whole from multiple sales under Alternative D are expected to be similar to those under Alternative D with one sale—local and short term, with no significant adverse effects. Given that resource estimates and development scenarios project an increase in resources and increases in the number of drill pads and pipeline miles, logic would assume increased effects to potentially affected resources, except for the fact that these effects would be spread over 2 decades. The biological analyses expect increases in effects with little overall effect to resource populations; therefore, effects associated with multiple sales on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and (especially) Nuiqsut as a result of impacts from disturbance and oil spills are expected to make no subsistence resource unavailable, undesirable for use, or experience overall population reductions. In any case, the cumulative effect of multiple sales under Alternative D would clearly be an increased development "footprint" and consequent increased habitat loss to resources and use area loss to hunters. This could affect subsistence harvests in the communities of Barrow, Atqasuk, and (especially) Nuiqsut and could alter caribou distributions sufficiently to make subsistence-hunter access more difficult. Impacts would be minimized from proposed stipulations and from the work of the Subsistence Advisory Panel designed to address local subsistence and cultural issues throughout the life of the plan.	**Multiple Sales**: The effect of multiple sales under Alternative E is expected to result in an increase in the amount of displacement of calving TLH caribou within 1.86 to 2.48 mi (3-4 km) of field roads. This effect is expected to persist over the life of the oil fields and may reduce productivity and abundance of the TLH. Some increase in impeding TLH caribou movements to insect relief areas along the coast, north of Teshekpuk Lake is expected under multiple sales. The number of small, chronic crude-oil and fuel spills is expected to increase and result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year. Based on the assumptions discussed in the text, each additional sale is expected to have similar effects on arctic fish as described for the single sale for the first sale. However, if there are increased levels of activity associated with future lease sales, and/or insufficient recovery time between sales, greater adverse effects than described for Alternative E are likely to occur. Increased disturbance and displacement effects and increased oil-spill risks are expected for birds, but timing of the sales again is critical to recovery. With extended intervals between sales, impacted bird populations are expected to recover from noise and disturbance effects in 1 year. Generally, overall effects are expected to increase substantially from those discussed for the first sale. The effects of multiple sales and increased potential for noise-producing activities and oil spills on bowhead whales at the resource ranges and activity levels described essentially are expected to be the same as described for the first sale. For other marine mammals, multiple sales are expected to have similar effects to those under Alternative E in the first sale, i.e., local and short term, with no significant adverse effects to marine mammal populations as a whole. Given that resource estimates and development scenarios project an increase in resources and large increases in the number of drill pads and pipeline miles, logic would assume increased effects to potentially affected resources, except for the fact that these effects would be spread over 2 decades. The biological analyses expect increases in effects with few overall effects to resource populations; therefore, effects associated with multiple sales on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and (especially) Nuiqsut as a result of impacts from disturbance and oil spills are expected to make no subsistence resource unavailable, undesirable for use, or experience overall population reductions. On the other hand, the cumulative effect of multiple sales clearly would be an increased development "footprint" and consequent increased habitat loss to resources and use loss to hunters. This could affect subsistence harvests in the communities of Barrow, Atqasuk, and (especially) Nuiqsut and could alter caribou distributions sufficiently to make subsistence-hunter access more difficult. Impacts would be minimized from proposed stipulations and from the work of the Subsistence Advisory Panel designed to address local subsistence and cultural issues throughout the life of the plan.	**Multiple Sales**: Effects from multiple sales to terrestrial mammals are expected to increase, but no significant impacts to populations are anticipated. Small numbers of terrestrial mammals would be lost due to the increase of small, chronic crude-oil and fuel spills, but populations are expected to recover within 1 year. Arctic fish populations would experience slightly increased effects but high-density fish areas would be deferred. Increased disturbance and displacement effects and increased oil-spills risks are expected for birds, but timing of the sales again is critical to recovery and prime goose molting habitat is deferred. With extended intervals between sales, impacted bird populations are expected to recover from noise and disturbance effects in 1 year. Bowhead whales are expected to experience short-term, nonlethal effects. Effects to seals and polar bear would be short term and local with no adverse effects to populations. Given that resource estimates and development scenarios project an increase in resources and an increase in the number of drill pads and pipeline miles, logic would assume increased effects to potentially affected resources, except for the fact that these effects would be spread over 2 decades. The biological analyses expect slight increases in effects with little overall effects to resource populations; therefore, effects associated with multiple sales on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and (especially) Nuiqsut as a result of impacts from disturbance and oil spills are expected to make no subsistence resource unavailable, undesirable for use, or experience overall population reductions.

TABLE II.D-2

SOCIOCULTURAL SYSTEMS		
Alternative D	**Alternative E**	**Preferred Alternative**
First Sale: Effects from management actions and oil and gas activities in the planning area under Alternative D are unlikely to disrupt sociocultural systems. Periodic, short-term disturbance effects would be expected on the sociocultural systems of Barrow, Atqasuk, and Nuiqsut but these disturbances are not expected to disrupt or displace institutions and sociocultural systems; community activities; and traditional practices for harvesting, sharing, and processing subsistence resources. Periodic disruptions to subsistence resources could occur, but any disruptions that occurred from oil and gas activities potentially would be mitigated by BLM in-place stipulations designed to protect caribou, waterfowl, fish, moose, and subsistence resources and harvest practices. Overall effects under Alternative D to the sociocultural systems of the communities of Barrow, Atqasuk, and Nuiqsut would increase over those in Alternative B, but there would continue to be no disruption or displacement of cultural institutions or sociocultural systems.	**First Sale:** Effects from management actions and oil and gas activities in the planning area under Alternative E are unlikely to disrupt sociocultural systems. Periodic, short-term disturbance effects would be expected to disrupt or displace institutions and sociocultural systems; community activities; and traditional practices for harvesting, sharing, and processing subsistence resources. Periodic disruptions to subsistence resources could occur, but any disruptions that occurred from oil and gas activities potentially would be mitigated by BLM in-place stipulations and mitigation measures designed to protect caribou, waterfowl, fish, moose, and specifically subsistence resources, subsistence practices, and hunter access. Overall effects under Alternative E to the sociocultural systems of the communities of Barrow, Atqasuk, and Nuiqsut would increase over those in Alternative B, but there would continue to be no disruption or displacement of cultural institutions or sociocultural systems.	**First Sale:** Effects from management actions and oil and gas activities in the planning area under the Preferred Alternative are unlikely to disrupt sociocultural systems. Periodic, short-term disturbance effects would be expected on the sociocultural systems of Barrow, Atqasuk, and Nuiqsut but these disturbances are not expected to disrupt or displace institutions and sociocultural systems; community activities; and traditional practices for harvesting, sharing, and processing subsistence resources. The effects of the Preferred Alternative are expected to be the same as Alternative C.
Multiple Sales: Effects from management actions and oil and gas activities in the planning area for multiple sales under Alternative D could disrupt sociocultural systems for periods up to 1 year, but impacts would not be expected to displace institutions and sociocultural systems; community activities; or traditional practices for harvesting, sharing, and processing subsistence resources, the same level of effect anticipated for multiple sales under Alternative B.	**Multiple Sales**: Effects from management actions and oil and gas activities in the planning area for multiple sales under Alternative E could disrupt sociocultural systems for periods up to 1 year, but impacts would not be expected to displace institutions and sociocultural systems; community activities; or traditional practices for harvesting, sharing, and processing subsistence resources, the same level of effect anticipated for multiple sales under Alternative B.	**Multiple Sales**: Effects from management actions and oil and gas activities in the planning area for multiple sales under the Preferred Alternative could disrupt sociocultural systems for periods of <1 year, but impacts would not be expected to displace institutions and sociocultural systems, community activities, or traditional practices for harvesting, sharing, and processing subsistence resources.
COASTAL ZONE MANAGEMENT		
Alternative D	**Alternative E**	**Preferred Alternative**

First Sale: Potential conflict with the habitat and subsistence standards of the ACMP is anticipated. Overall effects of oil and gas activities for Alternative D are expected to increase effects to terrestrial mammals, marine mammals, and subsistence resources and activities of local communities, over the effects of Alternative B. Although most of the increase in human activities is expected to occur inland, south of the coast, some increase in potential noise and disturbance effects to marine mammals other than bowhead whales are expected to occur in the Colville River Delta-southern Harrison Bay area. The CAH and TLH caribou herds are expected to be disturbed and their movements delayed near the pipeline during periods of air traffic. Surface, air, and foot traffic near oil fields is expected to increase and to displace some terrestrial mammals, but not significantly affect the Arctic Slope populations. If a field is developed in the area south and west of Teshekpuk Lake, some TLH caribou is expected to be displaced within 3 to 4 kilometers of roads and other production facilities over the life of the project. Subsistence resources would be impacted, but no resource would become unavailable, undesirable for use, or experience overall population reductions, resulting in no significant impacts to overall subsistence harvests and harvest patterns.	**First Sale:** Under Alternative E, conflicts could occur with the habitat, subsistence, and water quality standards of the ACMP. Overall effects of oil and gas activities for Alternative E are expected to significantly increase effects to terrestrial mammals, marine mammals, and subsistence resources and activities of local communities, over the effects of Alternative B. Conflicts could occur with specific Statewide standards and NSB CMP policies related to the potential for user conflicts between development activities and access to subsistence resources, and to adverse effects on subsistence resources. These effects would occur in the event of spilled oil contacting subsistence resources and habitats, and the activities associated with oil-spill cleanup. Overall effects associated with Alternative E on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and Nuiqsut, and other nearby communities from oil and gas activities in the planning area as a result of impacts from disturbance and oil spills are expected to increase over Alternative B. Subsistence resources would be chronically impacted, but still no resource would become unavailable, undesirable for use, or experience overall population reductions. Overall, effects are not expected to have significant impacts on subsistence-harvest patterns in Barrow and Atqasuk, although oil-development activity under Alternative E could make Nuiqsut's pursuit of caribou more difficult for at least an entire harvest season.	**First Sale:** Under the Preferred Alternative, conflicts could occur with specific Statewide standards and NSB CMP policies related to potential user conflicts between development activities and access to subsistence resources. Conflicts are possible with the NSB CMP policy related to adverse effects on subsistence resources resulting from periodic disturbance and oil spills, but no resource would become unavailable, undesirable for use, or experience overall population reductions. These effects would occur in the unlikely event of spilled oil contacting subsistence resources and habitats and the activities associated with oil-spill cleanup. However, the stipulations in place under the preferred alternative will reduce conflicts and the preferred alternative would be consistent with ACMP standards.
COASTAL ZONE MANAGEMENT		
Alternative D	**Alternative E**	**Preferred Alternative**

Multiple Sales: Effects from multiple sales under Alternative D may result in potential conflict with the habitat and subsistence standards of the ACMP. Multiple-sales effects under alternative D are expected to result in an increase in the amount of displacement of calving TLH caribou within 1.86 to 2.48 mi (3-4 km) of field roads assumed to be built between production pads south of Teshekpuk Lake. This effect is expected to persist over the life of the oil fields and may reduce productivity and abundance of the TLH. Some increase in the impedance of TLH caribou movements to insect relief areas along the coast, north of Teshekpuk Lake is expected under multiple sales. Small, chronic crude-oil and fuel spills is expected to increase and result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year. Based on the assumptions discussed in the text, each additional lease sale is expected to have similar effects on arctic fish as described for the first sale. However, if there are increased levels of activity associated with future lease sales, and/or insufficient recovery time between sales, greater adverse effects than described for the first sale are likely to occur. Increased disturbance and displacement effects and increased oil-spill risks are expected for birds, but timing of the sales again is critical to recovery. With extended intervals between sales, impacted bird populations are expected to recover from noise and disturbance effects in 1 year. The effects of multiple sales and increased potential for noise-producing activities and oil spills on bowhead whales at the resource ranges and activity levels described essentially are expected to be the same as described for the first sale. Effects to marine mammal populations as a whole from multiple sales under Alternative D are expected to be similar to those with one sale—local and short term, with no significant adverse effects. Under Alternative D, it is expected that protections for birds, fish, waterfowl, and terrestrial mammals, water quality, and subsistence-hunter concerns about access to resources and resource contamination would be addressed by stipulations.	**Multiple Sales**: Effects from multiple sales under Alternative E are expected to result in potential conflict with the habitat, subsistence, and water-quality standards of the ACMP. The effect of multiple sales under Alternative E is expected to result in an increase in the amount of displacement of calving TLH caribou within 1.86 to 2.48 mi (3-4 km) of field roads. This effect is expected to persist over the life of the oil fields and may reduce productivity and abundance of the TLH. Some increase in the impedance of TLH caribou movements to insect relief areas along the coast, north of Teshekpuk Lake is expected under multiple sales. The number of small, chronic crude-oil and fuel spills is expected to increase and result in the loss of small numbers of terrestrial mammals, with recovery expected within 1 year. Additional sales are expected to have similar effects on arctic fish as described for the first sale. However, if there are increased levels of activity associated with future lease sales, and/or insufficient recovery time between sales, greater adverse effects than described for the first sale are likely to occur. Increased disturbance and displacement effects and increased oil-spill risks are expected for birds, but timing of the sales again is critical to recovery. With extended intervals between sales, impacted bird populations are expected to recover from noise and disturbance effects in 1 year. The effects of multiple sales and increased potential for noise-producing activities and oil spills on bowhead whales at the resource ranges and activity levels described essentially are expected to have similar effects to those under Alternative E in the first sale, i.e., local and short term, with no significant adverse effects to marine mammal populations as a whole.	**Multiple Sales**: Effects from multiple sales to terrestrial mammals are expected to increase, but no significant impacts to populations are anticipated. Small numbers of terrestrial mammals would be lost due to the increase of small, chronic crude-oil and fuel spills, but populations are expected to recover within 1 year (Sec. IV.G.9). Arctic fish populations would experience slightly increased effects but high-density fish areas would be deferred. Increased disturbance and displacement effects and increased oil-spills risks are expected for birds, but timing of the sales again is critical to recovery and prime goose molting habitat is deferred. With extended intervals between sales, impacted bird populations are expected to recover from noise and disturbance effects in 1 year. Bowhead whales are expected to experience short-term, nonlethal effects. Effects to seals and polar bear would be short term and local with no adverse effects to populations. Given that resource estimates and development scenarios project an increase in resources and an increase in the number of drill pads and pipeline miles, logic would assume increased effects to potentially affected resources, except for the fact that these effects would be spread over 2 decades. The biological analyses expect slight increases in effects with little overall effects to resource populations; therefore, effects associated with multiple sales on subsistence-harvest patterns in the communities of Barrow, Atqasuk, and (especially) Nuiqsut as a result of impacts from disturbance and oil spills are expected to make no subsistence resource unavailable, undesirable for use, or experience overall population reductions.
RECREATION AND VISUAL RESOURCES		
Alternative D	**Alternative E**	**Preferred Alternative**

TABLE II.D-2

First Sale: As compared to Alternative A, there would be an increase of approximately 1,500 acres to 3,000 acres in adverse, short-term impacts to recreation values from activities other than oil and gas exploration and development. As compared to Alternative B, short-term impacts from ongoing oil and gas exploration activities would increase from approximately 9,000 acres to 34,000 acres. The greening of vegetation resulting from ice pads, roads, airstrips, and compacted snow would increase to about 1,400 acres, a 900-acre increase from Alternative B. Seismic operations would result in several hundred miles of green trails with likely increases over Alternative B directly corresponding to increases in seismic operations. Oil and gas development would result in the long-term loss of scenic quality, solitude, naturalness, or primitive/unconfined recreation over an area of approximately 123,000 acres (or 2.5% of the planning area) for the life of production fields and pipelines. This is 41,000 acres more than under Alternative B.	**First Sale:** As compared to Alternative A, there would be an increase of approximately 1,500 acres to 3,000 acres in adverse, short-term impacts to recreation values from activities other than oil and gas exploration and development. As compared to Alternative B, short-term impacts from ongoing oil and gas exploration activities would increase from approximately 9,000 acres to 34,500 acres in short-term impacts from active drilling operations. The greening of vegetation from ice pads, roads, airstrips, and compacted snow would increase to about 1,900 acres, a 1,400-acre increase from Alternative B. Oil and gas development would result in a long-term loss of scenic quality, solitude, naturalness, or primitive/unconfined recreation over an area of approximately 228,600 acres (or 5.0% of the planning area) for the life of production fields and pipelines. This is 156,600 acres more than under Alternative B.	**First Sale:** There would be approximately 2,000 acres in adverse, temporary impacts to recreation values from activities other than oil and gas exploration and development. Short-term (temporary) impacts from ongoing oil and gas exploration activities would impact approximately 26,000 acres. The greening of vegetation resulting from ice pads, roads, airstrips, and compacted snow would impact about 850 acres. Seismic operations would result in many hundreds of miles of green trails. Oil and gas development would result in the long-term loss of scenic quality, solitude, naturalness, or primitive/unconfined recreation over an area of approximately 101,000 acres (or 2.2% of the planning area) for the life of production fields and pipelines.
Multiple Sales: Long-term impacts would accumulate and increase about 67 percent above those of the first sale, ultimately affecting approximately 192,000 acres or about 4.2 percent of the planning area.	**Multiple Sales**: Long-term impacts would accumulate and increase about 51 percent above those of the first sale, ultimately affecting approximately 307,000 acres or about 6.7 percent of the planning area.	**Multiple Sales**: Long-term impacts will increase about 18 percent over those of the single sale, ultimately affecting about 119,000 acres or 2.6 percent of the planning area